DEPARTMENT OF AGRICULTURE,

BUREAU OF ENTOMOLOGY.

CATALOGUE

OF THE

EXHIBIT

OF

ECONOMIC ENTOMOLOGY

AT THE

WORLD'S INDUSTRIAL AND COTTON CENTENNIAL EXPOSITION,

NEW ORLEANS, 1884-'85.

WASHINGTON:
JUDD & DETWEILER, PRINTERS.
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DAPARTMENT OF AGRICULTURE,

BUREAU OF ENTOMOLOGY,

Washington, Dec. 8, 1884.

SIR: This Catalogue of the Entomological Exhibit of the Department of Agriculture for the World's Industrial and Cotton Centennial Exposition at New Orleans has been prepared, upon your approval, with the object of increasing the general usefulness of the exhibit. In its preparation the aim has been to add such information as the specimens or articles themselves do not convey.

The collection is made up of the following sections:

1. INSECTS INJURIOUS TO AGRICULTURE,

Arranged according to the particular plant and the particular part of the plant affected, and containing, as far as possible, the different states of growth of the insect, its enemies and parasites, a statement of the remedies or preventives available and a reference to the chief articles where full information can be found upon it. These references are, principally, to Government and State reports, to which the farmer will be most likely to have access. To this section of the exhibit I have added much material from my private collection whenever the material from the Department collection was insufficient, and a few specimens have also been added by Mr. SAM'L HENSHAW, of Boston, whose aid in the preparation of the exhibit and of the catalogue I take pleasure in here acknowledging. The catalogue of eight cases of insects injurious to forest trees is omitted for the reason that the collection did not arrive in time from Edinburgh, where I exhibited it last summer.

2. INSECTICIDE SUBSTANCES.

In the catalogue of this collection the aim has been to add, as briefly as possible, a statement of the method of using such substances, so that whenever in the first section a particular substance is recommended for a particular insect, the reader can turn to this second section for further details.

3. INSECTICIDE MACHINERY AND CONTRIVANCES FOR DESTROYING INSECTS.

In the catalogue of this section there is also added such information as will add to the instructive value of the exhibit, and it will be noted that

a large proportion of the more useful contrivances are such as have been designed and perfected in the work of the Bureau or of the U. S. Entomological Commission during the past four years, and chiefly by the aid of Dr. W. S. Barnard, who has had charge of this part of my work.

4. Bee-culture.

This collection is designed to show all the more valuable methods and contrivances now in use among advanced apiarians, and I am under obligations to Prof. A. J. Cook, of the Michigan Agricultural College, for his aid in getting the material together.

5. Silk-culture.

In this collection the aim has been to make the exhibit instructive, rather than full in detail, for the reason that other parties, and especially the Woman's Silk-culture Association of Philadelphia, propose a full exhibit in the Woman's Department of the Exposition.

The collection includes, in addition to the aforegoing, a number of framed plates, both colored and plain, that have been prepared in the work of the Bureau, and a number of my own enlarged colored diagrams of some of the more important injurious insects, all of which it has been deemed unnecessary to catalogue.

I have the honor to remain,

Yours, respectfully,

C. V. Riley,

Entomologist.

Wm. Saunders,

Representative of the Department of Agriculture,

World's Ind. & Cotton Cent. Exp., New Orleans.

INSECTS AFFECTING THE APPLE.

(Pyrus malus.)

Injuring the Roots.

1. APPLE-ROOT PLANT-LOUSE.

Schizoneura lanigera (Hausm.)

Syn. *Eriosoma pyri* (Fitch.)

[Injured roots: figures of roots, larva, winged form and details of structure from Riley's 1st Mo. Report.]

PARASITES:

Aphelinus mali (Hald.)

ENEMIES:

Scymnus cervicalis Muls.

1*a*. *Pipiza radicum* Riley.

[Figures in all stages from Riley's 1st Mo. Report.]

REMEDIES: Kerosene emulsion under and above ground; scalding water poured freely about roots; bisulphide of carbon.

CHIEF ARTICLES: Walsh, 1st Rept. Ins. Ill., p. 55–63; Riley, 1st Rept. Ins. Mo., p. 118–123; Comstock, Rept. Dept. Agric., 1879, p. 258–259.

Injuring the Trunk.

2. APPLE BARK-BEETLE.

Monarthrum mali (Fitch.)

[Adult beetle.]

3. APPLE-TREE XYLEBORUS.

Xyleborus obesus Lec.

[Bark showing work, adult beetles.]

4. ROUND-HEADED APPLE-TREE BORER.

Saperda candida Fabr.

Syn. *Saperda bivittata* Say.

[Wood with burrow of the larva, larva, adult beetles: figures of all stages from Riley's 1st Mo. Report.]

PREVENTIVES: Alkaline washes; soap; washing-soda; mixture of white-wash and Paris green.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 107–109; Riley, 1st Rept. Ins. Mo., p. 42–46.

5. FLAT-HEADED APPLE-TREE BORER.

Chrysobothris femorata (Fabr.)

[Twigs showing work of larva, larva, pupa, adult beetles: figures of all stages from Riley's 7th Mo. Report.]

PARASITES:

Chalcid sp.

5*a*. *Bracon charus* Riley.

[Figure from Riley's 7th Mo. Report.]

Cryptus grallator Say.

PREVENTIVES: Same as recommended for No. 4.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 46–47; 7th do., p. 71–79.

Injuring the Branches.

6. PERIODICAL CICADA.

Cicada septendecim Linn.

[Injured twigs, pupæ, adults.]

ENEMIES:

Stizus speciosus (Drury.)

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 18–42; 4th do., p. 30–34.

7. OYSTER-SHELL BARK-LOUSE.

Mytilaspis pomorum Bouché.

Syn. *Aspidiotus conchiformis* Gmelin.

Mytilaspis pomicorticis Riley.

[Twigs and bark with lice: figures of early stages with details of structure and of winged males from Riley's 1st and 5th Mo. Reports.]

PARASITES:

7*a*. *Aphelinus mytilaspidis* Le Baron.

[Figure of adult from Riley's 5th Mo. Report.]

7*b*. *Tyroglyphus malus* (Shimer.)

Syn. *Acarus malus* Shimer.

[Figures of adult mites from Riley's 5th Mo. Report.]

7*c*. *Chilocorus bivulnerus* Muls.

[Pupæ: adult beetles.]

REMEDIES: Kerosene emulsion; alkaline washes; linseed oil; scraping off the scales during the winter.

CHIEF ARTICLES: Walsh, 1st Rept. Ins. Ill., p. 34–53; Riley, 1st Rept. Ins. Mo., p. 7–18; 5th do., p. 73–96.

8. SCURVY BARK-LOUSE.

Chionaspis furfurus (Fitch.)

Syn. *Aspidiotus Harrisii* Walsh.

[Twigs and bark with lice: figures in different stages from Comstock's Report for 1880.]

REMEDIES: Same as given for No. 7.

CHIEF ARTICLE: Walsh, 1st Rept. Ins. Ill., p. 53–55.

9. IMBRICATED SNOUT-BEETLE.

Epicaerus imbricatus (Say.)

[Adult beetles: figures of the same from Riley's 3d Mo. Report.]

REMEDIES: Spread a sheet beneath the tree, or use a curculio-catcher, jar the tree and branches, gather the beetles and destroy them.

10. APPLE-TREE PRUNER.

Elaphidion villosum (Fabr.)

Syn. *Stenocorus putator* Peck.

[Twigs showing burrows, larva, adult beetles.]

REMEDIES: Collecting and burning the fallen branches.

CHIEF ARTICLES: Peck, Mass. Agric. Repository, v. 5; Harris, Ins. Inj. to Veg., p. 97–99.

11. APPLE-TWIG BORER.

Amphicerus bicaudatus (Say.)

[Adult beetles and injured twig: figure of injured twigs from Riley's 4th Mo. Report.]

REMEDIES: Cutting off infested branches and burning them.

CHIEF ARTICLES: Riley, 4th Rept. Ins. Mo., p. 51–53; 5th do., p. 54.

Injuring the Leaves.

12. APPLE-TREE APHIS.

Aphis mali Fabr.

[Injured leaves: figure of adult from Prac. Ent.]

ENEMIES:

12*a*. *Anatis 15-punctata* (Oliv.)

[Adult beetle.]

Harmonia picta (Randall.)

Cycloneda sanguinea (Linn.)

Adalia bipunctata (Linn.)

Coccinella venusta Melsh.
Coccinella 9-notata Herbst.
Hippodamia 13-punctata (Linn.)
Hippodamia convergens Guer.
12*b*. *Megilla maculata* (De Geer.)

[Adult beetle.]

REMEDIES: Pyrethrum; soap-suds; weak lye; tobacco water; etc., etc.

13. RESPLENDENT SHIELD-BEARER.

Aspidisca splendoriferella Clem.

[Injured leaves and adult moths: figures of injuries, insect in all stages and of parasite from Comstock's Report for 1879.]

PARASITES:

Microgaster sp.
Chalcid sp.

REMEDIES: Kerosene emulsion; alkaline washes; mixture of sulphur and lime; hand-gathering of cases in winter.

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1879, p. 210–213.

14. APPLE-TREE BUCCULATRIX.

Bucculatrix pomifoliella Clem.

[Cocoons and moths: figures of the same from Riley's 4th Mo. Report.]

PARASITES:

Encyrtus bucculatricis Howard.
14*a*. *Cirrospilus flavicinctus* Riley.

[Figure from Lintner's 1st N. Y. Report.]

REMEDIES: Arsenical mixtures.

CHIEF ARTICLES: Riley, 4th Rept. Ins. Mo., p. 49–51; Lintner, 1st Rept. Ins. N. Y., p. 163–167.

15. APPLE COLEOPHORA.

Coleophora malivorella Riley.

[Injured leaves, cases and moths: figures of injuries and insect in all stages from Riley's Report for 1878.]

CHIEF ARTICLES: Riley, Rept. Dept. Agric., 1878, p. 48–50; Lintner, 1st Rept. Ins. N. Y., p. 163–167.

16. EYE-SPOTTED BUD-MOTH.

Tmetocera ocellana (Schiff.)

[Work, chrysalis and adult moth.]

REMEDIES: Hand-picking of the withered clusters of leaves in early spring.

17. CHAPIN'S APPLE-LEAF-SEWER.

Phoxopteris nubeculana (Clem.)

[Work and adult moth: figures of leaf sewed together, early stages and moth from Riley's Report for 1878.]

REMEDIES: Collecting and destroying fallen leaves in the autumn.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1878, p. 34–36.

18. OBLIQUE-BANDED LEAF-ROLLER.

Cacoecia rosaceana (Harris.)

[Injured leaves, chrysalis and adult moths.]

REMEDIES: Arsenical mixtures.

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 480–481.

19. APPLE-LEAF-FOLDER.

Teras oxycoccana (Packard.)

Syn. *Tortrix cinderella* Riley.

Tortrix malivorana Le Baron.

Tortrix vaccinilivorana Packard.

[Adult moth: figures of moth, early stages and sewed leaf from Riley's 4th Mo. Report.]

REMEDIES: Same as those used for No. 18.

CHIEF ARTICLE: Riley, 4th Rept. Ins. Mo., p. 46–49.

20. RASCAL LEAF-CRUMPLER.

Acrobasis indigenella Zeller.

Syn. *Phycita nebulo* Walsh.

[Injured leaf, case of the larva and moth: figures of work and of the moth in different stages from Riley's 4th Mo. Report.]

PARASITES:

Tachina phycitae (Le Baron.)

Banchus fugitivus Say.

REMEDIES: Collecting and destroying the crumpled leaves during the winter; arsenical mixtures.

CHIEF ARTICLES: Walsh, 1st Rept. Ins. Ill., p. 34; Riley, 4th Rept. Ins. Mo., p. 38–42.

21. APPLE-LEAF SKELETONIZER.

Pempelia Hammondi Riley.

[Figures of the larva and moth with details of structure from Riley's 4th Mo. Report.]

REMEDIES: Hand-picking.

CHIEF ARTICLE: Riley, 4th Rept. Ins. Mo., p. 44–46.

22. SPRING CANKER-WORM.

Paleacrita vernata (Peck.)

[Larva, chrysalis and adult moths: figures of all stages with details of structure from Riley's 7th Mo. Report.]

PARASITES:

Tachina sp.

Microgaster sp.

ENEMIES:

Nothrus ovivorus Pack.

22*a*. *Sinea diadema* (Say.)
[Adults.]

22*b*. *Calosoma calidum* (Fabr.)
[Larva and beetle.]

22*c*. *Calosoma scrutator* (Fabr.)
[Adult beetle.]

22*d*. *Eumenes fraterna* Say.
[Adult wasp.]

REMEDIES: Arsenical mixtures; trapping female moths in oil-troughs or tar.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 460–472; Riley, 2d Rept. Ins. Mo., p. 94–103; 6th do., p. 24–29; 7th do., p. 80–90; 8th do., p. 12–22.

23. FALL CANKER-WORM.

Anisopteryx pometaria Harris.

Syn. *Anisopteryx autumnata* Pack.

[Larva, chrysalis and adult moths: figures of all stages with details of structure from Riley's 7th Mo. Report.]

ENEMIES:

Same as for No. 22.

REMEDIES:
CHIEF ARTICLES: } The same as for No. 22.

24. LIME-TREE WINTER-MOTH.

Hybernia tiliaria Harris.

[Chrysalis and adult male moth.]

REMEDIES: Same as for No. 22.

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 472–474.

25. WHITE EUGONIA.

Eugonia subsignaria (Hübn.)

[Eggs, larva, chrysalis, cocoon and adult moths.]

REMEDIES: Syringing with Paris green.

26. APPLE-TREE TENT-CATERPILLAR.

Clisiocampa americana Harris.

[Eggs, nest, chrysalids, cocoons and adult moths: figures of nest, early stages and moth from Riley's 3d Mo. Report.]

PARASITES:

Tachina sp.

26*a*. *Pimpla conquisitor* (Say.)

[Adult ♂ ♀.]

26*b*. *Ichneumon lactus* Brullé.

[Adult.]

REMEDIES: Collection and destruction of the eggs on the leafless twigs in autumn and winter and of the conspicuous nest during spring and summer.

CHIEF ARTICLES: Riley, 3d Rept. Ins. Mo., p. 117–121; 5th do., p. 56.

27. CECROPIA SILK-WORM.

Platysamia cecropia (Linn.)

[Larva, cocoon and adult moths.]

PARASITES:

Tachina sp.

27*a*. *Smicra mariae* (Riley.)

[Adults and figure of the same from Riley's 4th Mo. Report.]

27*b*. *Ophion macrurum* Linn.

[Adult.]

27*c*. *Cryptus extrematis* Cress.

[Adults.]

REMEDIES: Hand-picking of larvæ; destruction of cocoons during the winter.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 385–389; Riley, 4th Rept. Ins. Mo., p. 103–111.

28. WHITE-MARKED TUSSOCK-MOTH.

Orgyia leucostigma Sm. & Abb.

[Eggs, larva, chrysalis, cocoon, ♂ and ♀ moths: figures of all stages from Riley's 1st Mo. Report.]

REMEDIES: Arsenical mixtures; destruction of eggs during winter.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 367–368; Riley, 1st Rept. Ins. Mo., p. 144–147.

29. FALL WEB-WORM.

Hyphantria cunea Drury.

Syn. *Hyphantria textor* Harris.

[Nest, larva, chrysalis, cocoon and moths: figures of early stages and moth from Riley's 3d Mo. Report.]

ENEMIES:

29*a*. *Podisus spirosus* (Dallas.)

[Adult.]

REMEDIES: Removal and destruction of the webs.

CHIEF ARTICLE: Riley, 3d Rept. Ins. Mo., p. 130–132.

Injuring the Fruit.

30. PLUM CURCULIO.

Conotrachelus nenuphar (Herbst.)

[Work, larva and adult beetles: figures of work, early stages and beetle from Riley's 1st Mo. Report.]

PARASITES:

Porizon conotracheli Riley.

30*a*. *Sigalphus curculionis* Fitch.

[Figures of all stages from Riley's 3d Mo. Report.]

REMEDIES: Collection of adult beetles by jarring.

CHIEF ARTICLES: Walsh, 1st Rept. Ins. Ill., p. 64–72; Riley, 1st Rept. Ins. Mo., p. 50–62; 3d do., p. 11–29.

31. TEN-SPOTTED XANTHONIA.

Xanthonia 10-*notata* (Say.)

[Injured apple and adult beetles.]

32. INDIAN CETONIA.

Euphoria inda (Linn.)

[Injured apple and adult beetles.]

CHIEF ARTICLE: Lintner, 1st Rept. Ins. N. Y., p. 232–239.

33. APPLE MAGGOT.

Trypeta pomonella Walsh.

[Puparium and adult flies: figure of adult from Walsh's 1st Ill. Report.]

CHIEF ARTICLES: Walsh, 1st Rept. Ins. Ill., p. 29–33; Comstock, Rept. Dept. Agric., 1881, p. 195–198.

34. CODLING MOTH: APPLE WORM.

Carpocapsa pomonella Linn.

[Chrysalis and adult moths: figures of injured apple and moth in all stages from Riley's 1st Mo. Report.]

PARASITES:

34*a*. *Macrocentrus delicatus* Cress.
[Figure of adult from Riley's 5th Mo. Report.]

34*b*. *Pimpla annulipes* Brullé.
[Adult: figure of the same from Riley's 5th Mo. Report.]

ENEMIES:

34*c*. *Telephorus bilineatus* Say.
[Adult beetle: figures of larva and beetle from Riley's 4th Mo. Report.]

34*d*. *Chauliognathus pennsylvanicus* (De Geer.)
[Adult beetle: figures of all stages from Riley's 1st Mo. Report.]

REMEDIES: Trapping larvæ by applying bands to the trees; destroying infested fallen fruit.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 484–487; Walsh, 1st Rept. Ins. Ill., p. 27–29; Riley, 1st Rept. Ins. Mo., p. 62–67; 3d do., p. 101–104; 4th do., p. 22–30; 5th do., p. 46–52; 6th do., p. 9–10; Comstock, Rept. Dept. Agric., 1879, p. 253–255.

INSECTS AFFECTING THE PEAR.

(*Pyrus communis.*)

Injuring the Branches.

35. PEAR PSYLLA.

Psylla pyri Linn.

[Adult and figure of the same from Ill. Report.]

REMEDIES: Alkaline washes; solution of soft-soap and washing-soda.

36. SCURVY BARK-LOUSE.

Chionaspis furfurus (Fitch.)

Syn. *Aspidiotus Harrisii* Walsh.

[Branch with scales: figures in different stages from Comstock's Report for 1880.]

See No. 8.

37. PEAR-BLIGHT BEETLE.

Xyleborus pyri (Peck.)

[Injured branches and beetle.]

REMEDIES: Cutting off the blighted limbs.

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 90–91.

38. RUGULOSE BARK-BEETLE.
Scolytus rugulosus Ratz.

[Injured branches and beetles.]

Injuring the Leaves.

39. TARNISHED PLANT-BUG.
Lygus lineolaris (Beauv.)
Syn. *Capsus oblineatus* Say.

[Adult: figure of the same from Riley's 2d Mo. Report.]

REMEDIES: Jarring very early in the morning; kerosene emulsion; pyrethrum.

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 200–203; Riley, 2d Rept. Ins. Mo., p. 113–115.

40. PEAR TREE SLUG.
Selandria cerasi Peck.

[Injured leaves and adults.]

REMEDIES: Hellebore.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 528–532.

INSECTS AFFECTING THE PEACH.
(*Prunus Persica.*)

Injuring the Trunk.

41. ASPIDIOTUS ANCYLUS Putnam.

[Scales on bark: figure of ♀ from Comstock's Report for 1880.]

REMEDIES: Kerosene emulsion; alkaline washes.

42. ELM-BARK BEETLE.
Phlœotribus liminaris (Harris.)

[Specimens of injured trunk and adult beetles.]

43. RUGULOSE BARK-BEETLE.
Scolytus rugulosus Ratz.

[Injured bark and adult beetle.]

44. PEACH-BORER.

Aegeria exitiosa Say.

[Specimen showing injuries, larva, chrysalids and adult moth: figures of ♂ and ♀ moths from Riley's 1st Mo. Report.]

Remedies: Cutting out the larvæ late in the autumn or early in the spring; mounding around base; hot water.

Chief Articles: Riley, 1st Rept. Ins. Mo., p. 47–50; Comstock, Rept. Dept. Agric., 1879, p. 254–255.

Injuring the Branches.

45. PEACH BARK-LOUSE.

Lecanium persicae (Fabr.)

[Branches infested with scales.]

Remedies: Alkaline washes.

46. PERIODICAL CICADA.

Cicada septendecim Linn.

[Injured branch, pupæ, adults: figures of injured branch and insect in different stages from Riley's 1st Mo. Report.]

Enemies:

46*a*. *Sfizus speciosus* (Drury.)

[Adult.]

Preventive: Pruning and burning twigs containing eggs.

Chief Articles: Riley, 1st Rept. Ins. Mo., p. 18–42; 4th do., p. 30–34.

47. NEW YORK WEEVIL.

Ithycerus noveboracensis (Forst.)

[Injured branch and adult beetle: figures of injured branch, larva and adult beetle from Riley's 3d Mo. Report.]

Remedies: Jarring as with No. 9.

Chief Article: Riley, 3d Rept. Ins. Mo., p. 57–58.

Injuring the Leaves.

48. PEACH-TWIG MOTH.

Anarsia lineatella Zeller.

[Injured twig and adult moth.]

Remedies: Early pruning.

Chief Articles: Lintner, 1st Rept. Ins. N. Y., p. 151–156; Forbes, Trans. Wisc. Hort. Soc., v. 13, p. 26–29.

49. BLUE-SPANGLED PEACH-MOTH.

Callimorpha lecontei Boisd.

[Figures of larva and moth from Riley's 3d Mo. Report.]

REMEDIES: Arsenical mixtures; hand-picking.

INSECTS AFFECTING THE ORANGE.

(*Citrus.*)

CHIEF ARTICLES: Comstock, Rept. Dept. Agric., 1880, p. 202–208; Comstock and Howard, Rept. Dept. Agric., 1880, p. 276–333; Hubbard, Rept. Dept. Agric., 1881, p. 106–127.

50. RUST-MITE.

Phytopus oleivorus Ashmead.

[Figure, unpublished.]

REMEDIES: Alkaline washes; sulphur; kerosene emulsion.

51. TWO-STRIPED WALKING-STICK.

Anisomorpha buprestoides Stoll.

[Adults.]

52. LUBBER GRASSHOPPER.

Dictyophorus reticulatus Thunb.

Syn. *Romalea mieroptera* Serv.

[Larvæ, pupæ and adults.]

REMEDIES: Hand-picking.

CHIEF ARTICLE: Glover, Rept. Dept. Agric., 1872, p. 116: Shufeldt, Science, 1883.

53. ANGULAR-WINGED KATYDID.

Microcentrum retinervis Burm.

[Eggs, larva, pupa and adults.]

PARASITES:

53*a*. *Eupelmus mirabilis* (Walsh.)

[Figure of parasitized eggs of Katydid, of the pupa and adult parasite, from Walsh's paper in Amer. Ent., v. 2.]

REMEDIES: Collection of the eggs during winter.

CHIEF ARTICLES: Riley, 6th Rept. Ins. Mo., p. 155–164; Comstock, Rept. Dept. Agric., 1880, p. 249–251.

54. MOLE CRICKET.

Gryllotalpa borealis Burm.

[Larva and adult.]

Scale Insects.

55. Long-Threaded Mealy-Bug.

Dactylopius longifilis Comstock.

[Leaves with scales: figure of female from Comstock's Report.]

REMEDIES: Same as for No. 7.

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1880, pp. 276–349.

56. Destructive Mealy-Bug.

Dactylopius destructor Comstock.

[Leaves and scales: figure of female from Comstock's Report.]

PARASITES:

56*a*. *Encyrtus inquisitor* Howard.

[Figure of adult female from Howard's Report.]

REMEDIES: Same as for No. 7.

57. Hemispherical Lecanium.

Lecanium hemisphæricum Targioni.

[Leaves with scales: figures of adult ♂ and ♀ from Comstock's Report.]

REMEDIES: Same as for No. 7.

58. Black Scale.

Lecanium oleæ Bernard.

[Twigs with scales: figure of female from Comstock's Report.]

PARASITES:

58*a*. *Tomocera californica* Howard.

[Figures of ♂ and ♀ from Howard's Report.]

REMEDIES: Same as for No. 7.

59. Common Lecanium.

Lecanium hesperidum Linn.

[Leaves with scales: figures of adult females from Comstock's Report.]

PARASITES:

59*a*. *Comys bicolor* Howard.

[Figure of adult female from Howard's Report.]

59*b*. *Encyrtus flavus* Howard.

[Figure of adult from Howard's Report.]

59*c*. *Coccophagus cognatus* Howard.

[Figure of adult from Howard's Report.]

60. Florida Ceroplastes.

Ceroplastes floridensis Comstock.

[Twigs with scales: figures of adult and young females from Comstock's Report.]

PARASITES:

Chalcid sp.

REMEDIES: Same as for No. 7.

61. Barnacle Ceroplastes.

Ceroplastes cirripediformis Comstock.

[Figures of adult females from Comstock's Report.]

REMEDIES: Same as for No. 7.

62. Pergande's Scale.

Parlatoria pergandii Comstock.

[Leaves and twigs with scales: figure of adult male from Comstock's Report.]

REMEDIES: Same as for No. 7.

63. Ribbed Scale.

Icerya purchasi Maskell.

[Leaves and twigs with scales: figures of adult and young females from Comstock's Report.]

REMEDIES: Same as for No. 7.

64. White Scale.

Aspidiotus nerii Bouché.

[Leaves and bark with scales: figures of adult male, and male and female scales from Comstock's Report.]

REMEDIES: Same as for No. 7.

65. Circular Scale.

Aspidiotus ficus Riley.

[Leaves with scales: figures in various stages of development from Comstock's Report.]

REMEDIES: Same as for No. 7.

66. Red Scale.

Aspidiotus aurantii Maskell.

[Leaves with scales: figures of adult male, and male and female scales from Comstock's Report.]

REMEDIES: Same as for No. 7.

67. Glover's Scale.

Mytilaspis gloveri (Packard.)

[Twigs and leaves with scales: figures of eggs and male and female scales from Comstock's Report.)

PARASITES:

Aphelinus aspidioticola Ashmead.

REMEDIES: Same as for No. 7.

68. Purple Scale.

Mytilaspis citricola (Packard.)

[Twigs, leaves and fruit with scales: figures of eggs and male and female scales from Comstock's Report.]

PARASITES:

Signiphora flavopalliatus Ashmead.

REMEDIES: Same as for No. 7.

ENEMIES OF SCALE INSECTS:

Oribates aspidioti Ashmead.

Tyroglyphus gloveri Ashmead.

a. Chrysopa sp.
[Adult.]

b. Hyperaspidius coccidivora Ashmead.
[Adult.]

c. Scymnus bioculatus Muls.
[Adult.]

d. Scymnus cervicalis Muls.
[Adults.]

e. Exochomus contristatus Muls.
[Adult.]

f. Chilocorus cacti (Linn.)
[Adult.]

g. Chilocorus bivulnerus Muls.
[Pupæ and adults.]

h. Cycloneda abdominalis (Say.)
[Adult.]

i. Cycloneda oculata (Fabr.)
[Adult.]

j. Cycloneda sanguinea (Linn.)
[Adult.]

k. Coccinella 9-notata Herbst.
[Adults.]

l. Coccinella californica Mannerh.
[Adults.]

m. Hippodamia convergens Guer.
[Adult: figures of larva, pupa and adult from Riley's 1st Mo. Report.]

n. Hippodamia ambigua Lec.
[Adults.]

o. Megilla maculata (DeGeer.)
[Adults.]

p. Coccinellid.
[Figure of the larva from Riley's 1st Mo. Report.]

q. Dakruma coccidivora Comstock.
[Work and adult moth.]

69. COTTON STAINER.

Dysdercus suturellus H.-Schf.

[Larvæ, pupæ and adults.]

ENEMIES:

69*a*. *Leptocoiza tipuloides* Latr.

[Larva, pupa and adults.]

REMEDIES: Kerosene emulsion.

CHIEF ARTICLES: Comstock, Rept. Dept. Agric, 1879, p. 203–205; Hubbard, Bull. No. 1, Dept. Agric., p. 14–16.

70. LEAF-FOOTED PLANT-BUG.

Leptoglossus phyllopus (Linn.)

[Adults.]

71. EUTHOCTHA GALEATOR Fabr.

[Adults.]

72. RAPHIGASTER HILARIS Say.

[Eggs and adults.]

73. EUSCHISTUS FISSILIS Uhler.

[Adults.]

74. ARÆOCERUS FASCICULATUS (DeGeer.)

[Injured fruit and adults.]

75. HYPOTHENEMUS HISPIDULUS (Lec.)

[Injured twigs and adults.]

76. PACHNÆUS DISTANS Horn.

[Adult.]

77. FULLER'S ROSE-BEETLE.

Aramayus fulleri Horn.

[Adults: figures in all stages from Riley's Report for 1878.)

REMEDIES: Hand-picking; jarring as with No. 9.

CHIEF ARTICLES: Riley, Rept. Dept. Agric., 1878, p. 255–257.

78. ORANGE LEAF-NOTCHER.

Artipus floridanus Horn.

[Injured leaves and adult beetles: figures of the same from Comstock's Report for 1879.]

REMEDIES: Jarring as with No. 9.

79. EPITRAGUS TOMENTOSUS Lec.

[Adult beetles.]

80. LEPTOSTYLUS BIUSTUS Lec.

[Injured branch and adult beetle.]

81. ELAPHIDION INERME Newm,

[Injured branches and adult beetles.]

82. CHRYSOBOTHRIS CHRYSŒLA (Illig.)

[Adults.]

83. ORANGE LEAF-ROLLER.

Platynota rostrana (Walker.)

[Eggs and moth.]

REMEDIES: Hellebore; Paris green; hand-picking.

84. HOG CATERPILLAR: ORANGE DOG.

Papilio cresphontes Fabr.

Syn. *Papilio thaos* Boisd.

[Eggs, larva, chrysalids and butterflies.]

PARASITES:

84*a*. *Tachina* sp.

[Pupa, adult.]

REMEDIES: Hand-picking of the eggs and larvæ.

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1880, p. 246–248.

INSECTS AFFECTING THE STRAWBERRY.

(*Fragaria.*)

Injuring the Roots.

85. STRAWBERRY CROWN-BORER.

Tyloderma fragariæ (Riley.)

[Injured root, larva and adult beetle: figures of larva and beetle from Riley's 3d Mo. Report.]

CHIEF ARTICLES: Riley, 3d Rept. Ins. Mo., p. 42–44; Forbes, 12th Rept. Ins. Ill.

86. WHITE GRUB: JUNE BEETLE.

Lachnosterna fusca (Fröhl.)

Syn. *Lachnosterna quercina* (Knoch.)

[Larva and adult beetle: figures in all stages from Riley's 1st Mo. Report.]

ENEMIES:

86*a*. *Cordyceps ravenelii* Berkeley.

[Larva of L. fusca with fungus attached: figures of the same from Riley's 1st Mo. Report.]

86*b*. *Tiphia inornata* Say.

[Adult.]

REMEDIES: Luring beetles by lights over tubs into water with skim of kerosene. Use of lime and salt in the ground.

87. DIPLOTAXIS FRONDICOLA Say.

[Injured roots and adult beetles.]

Injuring the Leaves.

88. VARIABLE PARIA.

Paria aterrima Oliv.

Syn. *Paria sex-notata* (Say.)

[Injured leaf and adult beetles.]

REMEDIES: Hellebore; air-slacked lime.

CHIEF ARTICLE: Forbes, 13th Rept. Ins. Ill. p. 159–163.

89. SCELODONTA NEBULOSA (Lec.)

[Adult beetle.]

REMEDIES: Same as for No. 88.

CHIEF ARTICLE: Forbes, 13th Rept. Ins. Ill., p. 163–177.

90. STRAWBERRY LEAF-ROLLER.

Phoxopteris fragariæ Walsh & Riley.

[Adult moth: figures of the same with structural details of the larva from Riley's 1st Mo. Report.]

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 142–143; Forbes, 13th Rept. Ins. Ill., p. 87–93.

91. STRAWBERRY FALSE WORM.

Emphytus maculatus Norton.

[Larvæ and adult saw-flies: figures in all stages from Riley's 9th Mo. Report.]

REMEDIES: Hellebore.

CHIEF ARTICLE: Riley, 9th Rept. Ins. Mo. p. 27–29.

92. CANADIAN OSMIA,

Osmia canadensis Cress.

[Adult of an allied species.]

Injuring the Fruit.

93. DUSKY PLANT-BUG.

Deraeocoris rapidus Say.

[Adults.]

REMEDIES: Kerosene emulsion; pyrethrum.

CHIEF ARTICLE: Forbes, 13th Rept. Ins. Ill., p. 135–138.

94. TARNISHED PLANT-BUG,

Lygus lineolaris (Beauv.)

Syn. *Capsus oblineatus* Say.

[Adult.]

REMEDIES: Kerosene emulsion; pyrethrum.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 201–203; Riley, 2d Rept. Ins. Mo., p. 113–117; Forbes, 13th Rept. Ins. Ill., p. 115–135.

95. FLEA-LIKE NEGRO-BUG.

Corimelæna pulicaria Germ.

[Adults: figure of the same from Riley's 1st Mo. Report.]

INSECTS AFFECTING THE RASPBERRY.

(*Rubus.*)

Injuring the Roots.

96. RASPBERRY ROOT-BORER.

Bembecia marginata (Harr.)

Syn. *Aegeria rubi* Riley.

[Larva and adults: figures of adults from Riley's 6th Mo. Report.]

REMEDIES: Cutting off and destroying the infested roots.

CHIEF ARTICLE: Riley, 6th Rept. Ins. Mo. p. 111–113.

Injuring the Canes.

97. SNOWY TREE CRICKET.

Oecanthus niveus DeGeer.

[Injured canes, pupa, adult male and female: figures of adults from Riley's 1st Mo. Report.]

REMEDIES: Prune and burn infested canes.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 138–139; 5th do., p. 120–121.

98. RASPBERRY CANE-BORER.

Oberea bimaculata Oliv.

Syn. *Oberea tripunctata* Fabr.

[Injured canes and adult beetles.]

REMEDIES: Prune and burn infested canes.

99. RED-NECKED AGRILUS.

Agrilus ruficollis (Fabr.)

[Injured canes and adult beetle: figures of larva and beetle from the Amer. Ent.]

REMEDIES: Same as for No. 98.

CHIEF ARTICLE: Walsh & Riley, Amer. Ent. v. 2, p. 103.

Injuring the Leaves.

100. EUTHOCTHA GALEATOR Fabr.

[Adults.]

101. CRYPTOCEPHALUS 4-MACULATUS Say.

[Adult beetles.]

102. RASPBERRY LEAF-ROLLER.

Eccopsis permundana (Clem.)

[Chrysalis, adult moth.]

REMEDIES: Collect and burn infested twigs and leaves.

CHIEF ARTICLES: Comstock, Rept. Dept. Agric., 1880, p. 267–268.

103. RASPBERRY SAW-FLY.

Selandria rubi Harris.

[Injured leaves, larva and adult.]

REMEDIES: Hellebore.

Injuring the Fruit

104. RASPBERRY GEOMETER.

Synchlora rubivoraria (Riley.)

[Chrysalis, adult moths: figures of injured leaves, larva and moth from Riley's 1st Mo. Report.]

CHIEF ARTICLES: Riley, 1st Mo. Rept., p. 139–140.

INSECTS AFFECTING THE CURRANT.

(*Ribes.*)

Injuring the Stems.

105. CURRANT PSENOCERUS.

Psenocerus supernotatus (Say.)

[Injured stems, adult beetle.]

REMEDIES: Prune and burn infested stems.

106. CURRANT-BORER.

Aegeria tipuliformis Linn.

[Injured stems, chrysalis and adult moth: figure of moth from Prac. Ent.]

REMEDIES: Same as for No. 105.

Injuring the Leaves.

107. IMPORTED CURRANT-WORM.

Nematus ventricosus Klug.

[Adult saw-flies: figures of larvæ with details of structure and of male and female adults from Riley's 9th Mo. Report.]

PARASITES:

Tachina sp.
Brachypterus microptcrus Say.
Hemiteles nemativorus Walsh.

ENEMIES:

Myrmeleon sp.
Chrysopa sp.
107*a*. *Podisus placidus* Uhler.
[Adults.]

REMEDIES: Hellebore.

CHIEF ARTICLE: Riley, 9th Rept. Ins. Mo., p. 7–22.

108. NATIVE CURRANT-WORM.

Pristiphora grossulariæ Walsh.

[Adult: figures of larva and adult from Riley's 9th Mo. Report.]

REMEDIES: Hellebore.

CHIEF ARTICLE: Riley, 9th Rept. Ins. Mo., p. 23–27.

INSECTS AFFECTING THE GOOSEBERRY.

(*Ribes.*)

Injuring the Leaves.

109. GOOSEBERRY SPAN-WORM.

Eufitchia ribearia (Fitch.)

[Larva, chrysalids and adult moths: figures of early stages from Riley's 9th Mo. Report.]

PARASITES:

Tachina sp.

REMEDIES: Arsenical compounds; hand-picking.

CHIEF ARTICLE: Riley, 9th Rept. Ins. Mo., p. 3–7.

110. IMPORTED CURRANT-WORM.

Nematus ventricosus Klug.

[Larva, cocoon and adult saw-flies.]

REMEDIES: See No. 107.

CHIEF ARTICLE: See No. 107.

Injuring the Fruit.

111. GOOSEBERRY FRUIT-WORM.

Dakruma convolutella (Hübn.)

Syn. *Pempelia grossulariæ* Pack.

[Adult moth: figures of cocoon and moth from Riley's 1st Mo. Report.]

REMEDIES: Hand-picking; air-slacked lime.

CHIEF ARTICLE: Riley, 1st Rept. Ins. Mo., p. 140–142.

INSECTS AFFECTING THE MELON.

(*Cucurbitaceæ.*)

Injuring the Stems.

112. SQUASH BUG.

Coreus tristis DeGeer.

[Eggs, larvæ, pupæ and adults.]

REMEDIES: Pyrethrum.

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 194–197.

113. SQUASH BORER.

Melittia cucurbitæ (Harris.)

[Larva, chrysalis and adult moth.]

REMEDIES: Destruction of all vines attacked.

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 331.

Injuring the Leaves.

114. CUCUMBER FLEA-BEETLE.

Crepidodera cucumeris (Harris.)

[Adults: figure of the same from Riley's 1st Mo. Report.]

REMEDIES: Dusting with lime after sprinkling with decoction of tobacco stems and soap.

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 127–128.

115. STRIPED MELON BEETLE.

Diabrotica vittata (Fabr.)

[Adults: figures of larvæ and adults from Riley's 2d Mo. Report.]

REMEDIES: Paris green.

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 124–126.

116. SQUASH LADYBIRD.

Epilachna borealis (Fabr.)

[Larva, pupæ and adults.]

REMEDIES: Kerosene emulsion; arsenical mixtures.

CHIEF ARTICLES: Fitch, Ann. Reg. of Rural Affairs, 1868, p. 203.

117. MELON CATERPILLAR.

Eudioptis hyalinata (Linn.)

[Larva, chrysalids, cocoons and adults: figures of early stages and moths from Comstock's Report for 1879.]

PARASITES:

117*a*. *Tachina* sp.

[Figure of adult from Comstock's Report for 1879.]

117*b*. *Pimpla conquisitor* (Say.)

[Adult.]

REMEDIES: Early planting; hellebore.

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1879, p. 218–220.

Injuring the Fruit.

118. PICKLE WORM.

Eudioptis nitidalis (Cram.)

[Larva and adult moth: figures of injured cucumber, larva, chrysalis and moth from Riley's 2d Mo. Report.]

REMEDIES: Same as for No. 117.

CHIEF ARTICLE: Riley, 2d Rept. Ins. Mo., p. 64–70.

INSECTS AFFECTING THE CRANBERRY.

(*Vaccinium.*)

Injuring the Leaves.

119. TWO-STRIPED LOCUST.

Caloptenus bivittatus (Say.)

[Adult male and female.]

120. LEATHER-COLORED LOCUST.

Acridium alutaceum Harris.

[Adult.]

121. COMMON CRICKET.

Gryllus neglectus Scudd.

[Adult male and female.]

122. VINE WORM: FIRE WORM.

Rhopobota vacciniana (Packard.)

[Eggs, larva and adult moth.]

REMEDIES: Arsenical mixtures; proper flooding.

CHIEF ARTICLE: Smith, Bull. No. 4, Div. of Entom., Dept. Agric., p. 10–22.

123. GLISTENING CRANBERRY MOTH.

Teras oxycoccana (Packard.)

Syn. *Tortrix cinderella* Riley.
Tortrix malivorana LeBaron.
Tortrix vaccinivorana (Packard.)

[Injured leaves, larva, chrysalis and the orange and ash-gray forms of the moth: figures of folded leaf and insect in all stages from Riley's 4th Mo. Report.]

PARASITES:

123*a*. *Macrocentrus delicatus* Cress.
[Adult.]

REMEDIES: Flooding.

CHIEF ARTICLES: Riley, 4th Rept. Ins. Mo., p. 46–47; Smith, Bull. No. 4, Div. of Ent., Dept. Agric., p. 22–26.

124. CRANBERRY SPAN-WORM.

Cymatophora pampinaria Guen.

[Adult moth.]

REMEDIES: Same as for No. 122.

CHIEF ARTICLES: Smith, Bull. No. 4, Div. of Entomology, Dept. Agric., p. 26–28.

125. CHAIN-SPOTTED GEOMETER.

Zerene catenaria (Drury.)

[Larva, chrysalis, cocoon and adult moths.]

Injuring the Fruit.

126. CRANBERRY FRUIT MOTH.

Acrobasis vaccinniella Riley, MS.

[Injured berries, larvæ, cocoon and moth.]

REMEDIES: Same as for No. 122.

INSECTS AFFECTING THE PERSIMMON.

(*Diospyros virginiana.*)

Injuring the Trunk.

127. MINING SCALE.

Chionaspis biclavis Comstock.

[Scales on trunk.]

REMEDIES: Kerosene emulsion.

Injuring the Leaves.

128. PERSIMMON PSYLLA.
Trioza diospyrus Ashmead.

[Work and adults.]

129. GRAPHOLITHA MALACHITANA Zeller.

[Adult moth.]

130. REGAL WALNUT MOTH.
Citheronia regalis (Fabr.)

[Larva, chrysalis and adult moths.]

PARASITES:

130*a*. *Tachina* sp.

[Puparium and adult.]

CHIEF ARTICLE: Walsh & Riley, Amer. Ent., v. 1, p. 230–231.

131. APATELODES TORREFACTA Sm. & Abb.

[Larva and adult moth.]

INSECTS AFFECTING THE GRAPE-VINE.
(*Vitis.*)

Injuring the Roots.

132. GRAPE PHYLLOXERA.
Phylloxera vastatrix Planchon.
Syn. *Pemphigus vitifoliæ* Fitch.

[Injured roots and leaves with galls; figures of infested and healthy roots, leaf with galls, and of the Louse in all stages, from Riley's 6th and 8th Mo. Reports.]

ENEMIES:

132*a*. *Tyroglyphus phylloxeræ* Riley & Planchon.

[Figures of the adult from Riley's 6th Mo. Report.]

132*b*. *Thrips phylloxeræ* Riley.

[Figure of the adult from Prac. Ent.]

REMEDIES: Submersion; bisulphide of carbon; sulpho-carbonate of potassium; kerosene emulsion.

CHIEF ARTICLES: Walsh, 1st Rept. Ins. Ill., p. 21–24; Riley, 3d Rept. Ins. Mo., p. 84–96; 4th do., p. 55–71; 5th do., p. 57–73; 6th do., p. 30–87; 7th do., p. 90–121; 8th do., p. 157–168.

133. BROAD-NECKED PRIONUS.

Prionus laticollis (Drury.)

[Adult beetle: figure of pupa from Riley's 2d Mo. Report.]

REMEDIES: Hot-water; bisulphide of carbon; kerosene emulsion.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 124–128; 2d do., p. 87-88; 5th do., p. 56.

134. TILE-HORNED PRIONUS.

Prionus imbricornis (Linn.)

[Larva and adult beetles.]

REMEDIES: Same as for No. 133.

CHIEF ARTICLES: Riley, 2d Rept. Ins. Mo., p. 89–91.

135. GRAPE-ROOT BORER.

Aegeria polistiformis (Harris.)

[Larva, chrysalis and adult moth: figures of male and female moths from Riley's 3d Mo. Report.]

REMEDIES: Same as for No. 133.

CHIEF ARTICLES: Walsh, 1st Rept. Ins. Ill., p. 24–27; Riley, 3d Rept. Ins. Mo., p. 75–77.

Injuring the Trunk and Branches.

136. SNOWY TREE-CRICKET.

Oecanthus niveus DeGeer.

[Injured branches and adult ♂ and ♀ crickets.]

REMEDIES: Pruning and burning infested twigs.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 138–139; 5th do., p. 120–121.

137. OECANTHUS LATIPENNIS Riley.

[Injured branch and adult ♂ and ♀ crickets.]

REMEDIES: Same as for No. 136.

CHIEF ARTICLE: Riley, Bull. No. 6, U. S. E. C., Index to Mo. Repts., p. 60–61.

138. GRAPE-VINE BARK-LOUSE.

Pulvinaria innumerabilis Rathvon.

[Bark with scales: figure of female scales from Comstock's Report for 1880.]

REMEDIES: Same as for No. 7.

CHIEF ARTICLES: J. D. Putnam, Proc. Davenport Ac. Nat. Sc., Vol. II, 239–246.

139. GRAPE-CANE GALL-CURCULIO.

Ampeloglypter sesostris (Lec.)

Syn. *Madarus vitis* Riley.

[Galls on branches, adult beetle: figure of adult beetle from Riley's 1st Mo. Report.]

REMEDIES: Destruction of gall bearing canes.

CHIEF ARTICLE: Riley, 1st Rept. Ins. Mo. p. 131–132.

140. APPLE-TWIG BORER.

Amphicerus bicaudatus (Say.)

[Injured branch, adult beetle.]

REMEDIES: Destruction of infested branches.

CHIEF ARTICLES: Riley, 4th Rept. Ins. Mo., p. 51–53; 5th do., p. 54.

141. RED-SHOULDERED SINOXYLON.

Sinoxylon basilare (Say.)

[Injured branches, adult beetle: figures in all stages from Riley's 4th Mo. Report.]

REMEDIES: Burning infested wood.

CHIEF ARTICLE: Riley, 4th Rept. Ins. Mo., p. 53–54.

142. GRAPE-VINE FILBERT-GALL.

Lasioptera sp.

[Gall and figure of the same from Riley's 5th Mo. Report.]

CHIEF ARTICLE: Riley, 5th Rept. Ins. Mo., p. 116–117.

143. GRAPE-VINE APPLE-GALL.

Lasioptera sp.

[Gall: figure of the gall and of the adult fly from Riley's 5th Mo. Report.]

CHIEF ARTICLES: Riley, 5th Rept. Ins. Mo., p. 114–116.

144. GRAPE-VINE TOMATO-GALL.

Lasioptera vitis O. S.

[Galls, pupæ and adults: figure of the gall from Riley's 5th Mo. Report.]

CHIEF ARTICLE: Riley, 5th Rept. Ins. Mo., p. 117–118.

145. WAVED PROCONIA.

Proconia undata Fabr.

[Larva, pupa and adults.]

Injuring the Leaves and Stems.

146. GRAPE-VINE LEAF-HOPPER.

Erythroneura vitis (Harris.)

[Adults: figures of the same from Prac. Ent.]

ENEMIES:

146*a*. *Campyloneura vitripennis* Say.

[Adult: figures of larva and adult from Riley's 3d Mo. Report.]

REMEDIES: Tobacco water or vapor; smoke.

CHIEF ARTICLE: Walsh, Prac. Ent., v. 2, p. 49–52.

147. GRAPE-VINE APHIS.

Siphonophora viticola Thomas.

[Adults.]

REMEDIES: Pyrethrum; soap-suds; weak lye; tobacco water.

CHIEF ARTICLE: Thomas, 3d Rept. Ins. Ill., p. 55.

148. RED-HEADED SYSTENA.

Systena frontalis (Fabr.)

[Adult.]

149. GRAPE-VINE FLEA-BEETLE.

Graptodera chalybea (Illig.)

[Injured leaf, larva, adults: figures of injured leaf and beetle in all stages from Riley's 3d Mo. Report.]

REMEDIES: Arsenical mixtures; kerosene.

CHIEF ARTICLES: Riley, 3d Rept. Ins. Mo., p. 79–81; Comstock, Rept. Dept. Agric., 1879, p. 213–216.

150. GRAPE-VINE COLASPIS.

Colaspis brunnea Fabr.

Syn. *Colaspis flavida* Say.

[Injured leaves, adult beetles: figures of larva and adults from Riley's 3d Mo. Report.]

REMEDIES: Jarring; ashes; soot; lime.

CHIEF ARTICLE: Riley, 3d Rept. Ins. Mo., p. 81–84.

151. GRAPE-VINE ADOXIS.

Adoxis vitis Linn.

[Adult beetles.]

152. GRAPE-VINE FIDIA.

Fidia longipes (Melsh.)

Syn. *Fidia viticida* Walsh.

[Injured leaf, adult beetle: figure of adult beetle from Prac. Ent.]

REMEDIES: Jarring.

CHIEF ARTICLES: Walsh, Prac. Ent., v. 2, p. 87–88; Riley, 1st Rept. Ins. Mo., p. 132–133.

153. SPOTTED PELIDNOTA.

Pelidnota punctata (Linn.)

[Twig showing work of larva, larva, pupa, cocoon and adult beetles: figures in all stages from Riley's 3d Mo. Report.]

REMEDIES: Hand-picking.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 25–26; Riley, 3d Rept. Ins. Mo., p. 77–79.

154. VARIED ANOMALA.

Anomala varians Burm.

[Injured leaf and adult beetles.]

155. ROSE-CHAFER.

Macrodactylus subspinosus Fabr.

[Injured leaves, larva, pupa, adult beetles: figure of adult beetle from Riley's 5th Mo. Report.

REMEDIES: Pyrethrum; concentrating beetles on Clinton-vines and Spiræa.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 35-39; Riley, 5th Rept. Ins. Mo., p. 108–111; Lintner, 1st Rept. Ins. N. Y., p. 227–232.

156. GRAPE-LEAF TRUMPET-GALL.

Lasioptera viticola O. S.

[Leaf with galls: figure of the same from Riley's 5th Mo. Report.]

CHIEF ARTICLE: Riley's 5th Rept. Ins. Mo., p. 118-119.

157. GRAPE-VINE PLUME.

Oxyptilus periscelidactylus (Fitch.)

[Chrysalis and adult moth: figures of early stages and of moth from Riley's 3d Mo. Report.]

REMEDIES: Hand-picking.

CHIEF ARTICLES: Fitch, 1st Rept. Ins. N. Y., p. 139–143; 3rd do., p. 84; Riley, 1st Rept. Ins. Mo., p. 137–138; 3d do., p. 65–68.

158. GRAPE LEAF-FOLDER.

Desmia maculalis Westw.

[Chrysalids and moths: figures of early stages and of moths from Riley's 3d Mo. Report.]

Remedies: Hand-picking.

Chief Article: Riley, 3d Rept. Ins. Mo. p. 61–63.

159. YELLOW-BEAR CATERPILLAR.

Spilosoma virginica (Fabr.)

[Chrysalids and moths: figures of early stages and of moth from Riley's 3rd Mo. Report.]

Remedies: Hand-picking.

Chief Articles: Harris, Ins. Inj. to Veg., p. 349–351; Riley, 3d Rept. Ins. Mo. p. 68–69.

160. AMERICAN PROCRIS.

Procris americana Harris.

[Injured leaves, eggs, larva, chrysalis, cocoons and adult moths: figures of injured leaf and of moth in all stages from Riley's 2d Mo. Report.]

Remedies: Hand-picking.

Chief Articles: Harris, Ins. Inj. to Veg., p. 336–338; Riley, 2d Rept. Ins. Mo., p. 85–87.

161. BEAUTIFUL WOOD NYMPH.

Eudryas grata Fabr.

[Larva, adult moth: figure of larva with details of structure of the moth from Riley's 6th Mo. Report.]

Parasites:

Tachina sp.

Remedies: Same as for No. 160.

Chief Articles: Riley, 2d Rept. Ins. Mo., p. 83; 6th do., p. 88–90; Lintner, 26th Ann. Rept. N. Y. Mus. Nat. Hist., p. 122–124.

162. PEARL WOOD NYMPH.

Eudryas unio Hübn.

[Adult moth: figures of the same from Riley's 6th Mo. Report.]

Remedies: Same as for No. 160.

Chief Articles: Riley, 2d Rept. Ins. Mo., p. 83–85; 6th do., p. 90–94; Lintner, 26th Ann. Rept. N. Y., Mus. Nat. Hist., p. 122–129.

163. EIGHT-SPOTTED FORESTER.

Alypia octomaculata Fabr.

[Larva and adult moths: figure of larva and moth from Riley's 2d Mo, Report.]

PARASITES:

163*a*. *Tachina* sp.

[Puparium and adult flies.]

REMEDIES: Same as for No. 160.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 136–137: 2d do., p. 80–82; 6th do., p. 94–96.

164. HOG CATERPILLAR OF THE VINE.

Darapsa myron (Cramer.)

Syn. *Chærocampa pampinatrix* Sm.

[Larva, chrysalids and adult moths: figures of larva and chrysalis from Riley's 2d Mo. Report.]

REMEDIES: Hand-picking.

CHIEF ARTICLE: Riley, 2d Rept. Ins. Mo. p. 71–73.

165. SATELLITE SPHINX.

Philampelus satellitia (Linn.)

[Larva and adult moth: figures of the same from Riley's 2d Mo. Report.]

REMEDIES: Hand-picking.

CHIEF ARTICLE: Riley, 2d Rept. Ins. Mo., p. 76–78.

166. ACHEMON SPHINX.

Philampelus achemon (Drury.)

[Larvæ, chrysalis and adult moths.]

REMEDIES: Hand-picking.

CHIEF ARTICLE: Riley, 2nd Rept. Ins. Mo., p. 74–76.

167. WHITE-LINED MORNING SPHINX.

Deilephila lineata (Fabr.)

[Larva and adult moth.]

REMEDIES: Hand-picking.

CHIEF ARTICLE: Riley, 3d Rept. Ins. Mo., p. 140–142.

168. ABBOT'S SPHINX.

Thyreus abbotii Swains.

[Larva, chrysalis and adult moths: figures of larva and adult moth from Riley's 2d Mo. Report.]

REMEDIES: Hand-picking.

CHIEF ARTICLE: Riley, 2d Rept. Ins. Mo., p. 78–79.

169. GRAPE-VINE SAW-FLY.

Selandria vitis Harris.

[Injured leaves and adults.]

REMEDIES: Hellebore.

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 522–525.

Injuring the Fruit.

170. GRAPE CURCULIO.

Craponius inæqualis (Say.)

[Adult beetle: figures of larva and beetle from Riley's 1st Mo. Report.]

REMEDIES: Jarring.

CHIEF ARTICLE: Walsh, 1st Rept. Ins. Ill., p. 13–21; Riley, 1st Rept. Ins. Mo., p. 128–129.

181. INDIAN CETONIA.

Euphoria inda (Linn.)

[Adult beetles.]

CHIEF ARTICLES: Lintner, 1st Rept. Ins. N. Y., p. 232–239.

172. GRAPE-FRUIT MOTH.

Eudemis botrana (Schiff.)

Syn. *Penthina vitivorana* (W. & R.)

[Adult moth: figures of injured berries, larva and adult moth from Amer. Ent.]

REMEDIES: Destruction of young worms.

CHIEF ARTICLES: Walsh and Riley, Amer. Ent., v. 1, p. 177–179; Riley 1st Rept. Ins. Mo., p. 133–136.

173. GRAPE-SEED MAGGOT.

Isosoma vitis Saunders.

[Figures of adults with details of structure from Riley's 2d Mo. Report.]

REMEDIES: Destruction of the shrivelled fruit.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 129–131; 2d do., p. 92–94.

174. HONEY BEE.

Apis mellifica Linn.

[Adult bees.]

INSECTS AFFECTING THE SUGAR CANE.

(*Saccharum officinarum.*)

175. SUGAR CANE BEETLE.

Ligyrus rugiceps Lec.

[Injured stalks and adult beetles: figures of the same from Comstock's Report for 1878.]

REMEDIES: Trap lanterns.

CHIEF ARTICLES: Comstock, Rept. Dept. Apric., 1879, p. 246–257; do., 1880, p. 236–240; Spec. Rept. No. 35, Dept. Agric., 1881, p. 8–11.

176. SUGAR CANE BORER.

Chilo saccharalis (Fabr.)

[Injured stalks, larva: figures of stalks and insect in all stages from Comstock's Report for 1880.]

REMEDIES: Burning stalks and stubble before February.

CHIEF ARTICLES: Comstock, Rept. Dept. Agric., 1880, p. 240–242; Spec. Rept. No. 35, Dept. Agric., 1881, p. 3–8.

INSECTS AFFECTING THE HOPS.

(*Humulus lupulus.*)

Injuring the Roots.

177. HOP GRUB.

Hydræcia immanis Guén.

[Injured roots, larva, chrysalis and adult moth.]

177*a*. *Tachina* sp.

[Puparium and adult fly.]

CHIEF ARTICLE: Smith, Bull. No. 4, Div. of Ent., Dept. Agric., p. 34–39.

Injuring the Leaves.

178. HOP PLANT-LOUSE.

Aphis humuli Schrank.

[Leaves showing injuries, adults.]

REMEDIES: Pyrethrum; whale oil soap.

179. HOP SNOUT-MOTH.

Hypena humuli Harris.

[Chrysalids and moths.]

CHIEF ARTICLES: Harris. Ins. Inj. to Veg., p. 477–478; Smith, Bull. No. 4, Dept. Agric., p. 39.

180. COMMA BUTTERFLY.

Grapta comma (Harris.)

[Adults.]

181. SEMICOLON BUTTERFLY.

Grapta interrogationis (Fabr.)

[Larva, chrysalids, adult butterfly.]

INSECTS AFFECTING RICE.

(*Oryza sativa.*)

Injuring the Roots.

182. WATER WEEVIL.

Lissorhoptrus simplex (Say.)

[Larvæ and adults: figures of larva and adult beetle with details of structure from Riley's Report for 1881.]

REMEDIES: Draining.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1881, p. 128–129.

183. RICE GRUB.

Chalepus trachypygus Burm.

[Larva and beetles: figures of the same from Riley's Report for 1881.]

REMEDIES: Flooding; rotation of crops.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1881, p. 128–129.

Injuring the Stalks.

184. RICE STALK-BORER.

Chilo oryzæellus Riley.

[Injured stalks, larva, chrysalids and adult moth: figures of all stages from Riley's Report for 1881.]

PARASITES:

184*a*. *Phora aletiæ* Comstock.

[Parasitized larva, puparium and adult fly.]

REMEDIES: Burning stubble.

CHIEF ARTICLES: Riley, Rept. Dept, Agric., 1881, p. 133–135.

185. GRASS WORM.

Laphygma frugiperda Sm. & Abb.

Syn. *Prodenia autumnalis* Riley.

[Larva, chrysalis, adult moth.]

REMEDIES: Flooding.

CHIEF ARTICLE: Riley, 3d Rept. Ins. Mo., p, 109–116; Amer. Ent., v. 1, p. 363–365.

INSECTS AFFECTING INDIAN CORN.

(*Zea mays.*)

186. CHINCH BUG.

Blissus leucopterus (Say.)

[Adult: figures in all stages from Riley's 7th Mo. Report.]

REMEDIES: Burning stalks; kerosene emulsion.

CHIEF ARTICLES: Walsh and Riley, Amer. Ent., vol. 1, p. 169–177, 194–199; Riley, 2d Rept. Ins. Mo., p. 15–37; 7th do., p. 29–71; Thomas, Bull. No. 5, U. S. Ent. Comm., p. 44.

187. SPHENOPHORUS PARVULUS Gyll.

[Adult weevils.]

188. CORN BILL-BUG.

Sphenophorus robustus Horn.

[Injured roots, adult weevil: figures of all stages from Riley's Report for 1881.)

REMEDIES: Burning stalks and stubble; arsenical mixtures.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1881, p. 138–142.

189. CORN SPHENOPHORUS.

Sphenophorus sculptilis Uhler.

Syn. *Sphenophorus zeæ* Walsh.

[Adult weevils; figures of the same from Riley's 3d Mo. Report.]

REMEDIES: Same as for No. 188.

CHIEF ARTICLES: Riley, 3d Rept. Ins. Mo., p. 59; Comstock, Rept. Dept. Agric., 1880, p. 272–273; Lintner, 1st Rept. Ins. N. Y., p. 253–263.

190. SPHENOPHORUS PERTINAX. Oliv.

[Adult weevils.]

REMEDIES: Same as for No. 188.

191. LONG-HORNED DIABROTICA.

Diabrotica longicornis (Say.)

[Adult beetles.]

REMEDIES: Lime and ashes; rotation of crops.

CHIEF ARTICLE: Riley, Amer. Ent., v. 3, p. 247.

192. TWELVE-SPOTTED DIABROTICA.

Diabrotica 12-punctata (Oliv.)

[Specimen showing injury, adult beetle: figure of beetle from Riley's 2d Mo. Report.]

193. EUPHORIA MELANCHOLICA (Gory.)

Adult beetle.]

194. INDIAN CETONIA.

Euphoria inda (Linn.)

[Adult beetles: figure of the same from Amer. Ent.]

REMEDIES: Arsenical mixtures.

CHIEF ARTICLE: Lintner, 1st Rept. Ins. N. Y., p. 232–239.

195. CORN WIRE-WORM.

Agriotes mancus (Say.)

[Larva, adult beetle.]

196. SEED-CORN MAGGOT.

Anthomyia zeæ Riley.

[Injured seed and adult fly: figures of injured seed and early stages from Riley's 1st Mo. Report.]

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 154–156; Lintner, 1st Rept. Ins. N. Y., p. 199–201.

197. CORN-STALK BORER.

Chilo saccharalis (Fabr.)

[Injured stalks, chrysalids and adult moth.]

PARASITE:

197*a*. *Ichneumonid* sp.

REMEDIES: Burning stubble.

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1880, p. 243–245.

198. SMALL CORN-STALK BORER.

Pempelia lignosella Zeller.

[Injured stalk, larva, cocoons and adult moth: figures of injured stalk and insect in all stages with details of structure from Riley's Report for 1881.]

REMEDIES: Burning stubble.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1881, p. 142–145.

199. STALK BORER.

Gortyna nitela Guen.

[Adult moths: figures of larva and moth from Riley's 1st Mo. Report.]

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 92–93; 3d do., p. 105–109; Lintner, 1st Rept. Ins. N. Y., p. 110–116.

200. CORN WORM: BOLL WORM.

Heliothis armigera Hübn.

[Injured ear of corn, larva and adult moths.]

PARASITES:

200*a*. *Tachina* sp.

[Puparium and adult fly.]

REMEDIES: Pyrethrum; capture of moths by lights.

CHIEF ARTICLES: Riley, 3d Rept. Ins. Mo., p. 104–109; Rept. Dept. Agric., 1881, p. 145–152; Lintner, 1st Rept. Ins. N. Y., p. 116–126.

Injuring Stored Corn.

201. RICE WEEVIL.

Calandra oryzæ Linn.

[Injured ear of corn and adult beetles.]

PARASITES:

201*a*. *Pteromalus calandræ* Howard.

[Adult.]

REMEDIES: Bisulphide of carbon in air-tight vessels.

202. TRIBOLIUM FERRUGINEUM (Fabr.)

[Injured ear of corn (same as No. 201,) larval skins and adult beetles.]

203. TYPHŒA FUMATA (Linn.)

[Injured kernels of corn, adult beetles.]

204. SILVANUS SURINAMENSIS (Linn.)

[Larval skins, adult beetles: figure of adult beetle from Amer. Ent.]

205. SILVANUS ADVENA (Waltl.)

[Injured kernels of corn and adult beetle.]

ENEMIES:

205*a*. *Trogosita nana* Melsh.

[Adults: figures of larva and beetle with details of structure of *T. corticalis* Melsh., a closely allied species, from LeBaron's 4th Ill. Report.]

206. GELECHIA CEREALELLA Linn.

[Injured ear and kernels of corn, adult moths.]

INSECTS AFFECTING SMALL GRAINS.

(*Triticum, Hordeum, Avena, etc.*)

207. ROCKY MOUNTAIN LOCUST.

Caloptenus sprteus Uhler.

[Eggs, larvæ, pupæ, adults: figures showing oviposition, the process of acquiring wings, and the locust in all stages from Riley's 7th, 8th and 9th Reports.]

PARASITES:

207*a*. *Anthomyia angustifrons* Meigen.
[Puparium, adult fly: figures in all stages from Riley's 9th Mo. Report.]

207*b*. *Sarcophaga carnaria* Linn.
[Adult fly: figures in all stages from Riley's 7th Mo. Report.]

207*c*. *Tachina anonyma* Riley.
[Adult fly.]

ENEMIES:

207*d*. *Amblychila cylindriformis* Say.
[Adult.]

207*e*. *Cicindela splendida* Hentz.
[Adult: figures of larva and adult from 1st Report U. S. Ent. Comm.]

207*f*. *Cicindela repanda* Dej.
[Adult.]

207*g*. *Elaphrus ruscarius* Say.
[Adult.]

207*h*. *Calosoma calidum* (Fabr.)
[Adult.]

207*i*. *Calosoma scrutator* (Fabr.)
[Adult.]

207*j*. *Pasimachus elongatus* Lec.
[Adult.]

207*k*. *Amara obesa* Say.
[Adult: figures in all stages from 1st Report Ent. U. S. Comm.]

207*l*. *Agonoderus comma* Fabr.
[Adult.]

207*m*. *Harpalus caliginosus* (Fabr.)
[Adult.]

207*n*. *Harpalus pennsylvanicus* (DeGeer.)
[Adult.]

207*o*. *Chauliognathus pennsylvanicus* (DeGeer.)
[Adult.]

207*p*. *Telephorus bilineatus* (Say.)
[Adult.]
207*q*. *Macrobasis unicolor* (Kirby.)
[Adult.]
207*r*. *Epicauta pennsylvanica* (DeGeer.)
[Adult.]
207*s*. *Prionony x atrata* St. Farg.
[Adult.]
207*t*. *Larrada semirufa* Cress.
[Figure of adult from 1st Report U. S. Ent. Comm.]
207*u*. *Proctacanthus milberti* Macq.
[Adult.]
207*v*. *Erax bastardi* Macq.
[Figures in all stages from Riley's 2d Mo. Report.]
207*w*. *Triodites mus* O. S.
[Figures in all stages from 2d Report U. S. Ent. Comm.]
207*x*. *Systœchus oreas* O. S.
[Figures in all stages from 2d Report U. S. Ent. Comm.]
207*y*. *Apiomerus crassipes* Say.
[Adult.]
207*z*. *Mantis carolina* Say.
[Adult.]
207*aa*. *Libellula trimaculata* DeGeer.
[Adult.]
207*bb*. *Trombidium locustarum* Riley.
[Figures in all stages from 1st Report U. S. Ent. Comm.]
Trombidium giganteum Riley.

Remedies: Coal tar; kerosene in pans; ditching; burning; rolling; catching; smoking; plowing of eggs.

Chief Articles: Walsh, 1st Rept. Ins. Ill., p. 82–103; Riley, 7th Rept. Ins. Mo., p. 121–196; 8th do., p. 57–156; 9th do., p. 57–124; 1st, 2d, 3d Repts. U. S. Ent. Com., Washington, 1878–1883.

208. ATLANTIC LOCUST.

Caloptenus atlanis Riley.

[Adult male and female.]

209. RED-LEGGED LOCUST.

Caloptenus femur-rubrum DeGeer.

[Adult male and female.]

210. CALIFORNIA LOCUST.

Camnula atrox Scudd.

[Adult male and female.]

211. WESTERN CRICKET.

Anabrus purpurascens Uhler.

[Adult male and female.]

REMEDIES: Same as for No. 207.

CHIEF ARTICLES: 2d and 3d Repts. U. S. Ent. Comm., Wash., 1880–1883.

212. CHINCH BUG.

Blissus leucopterus (Say.)

[Adults: figures of early stages with details of structure from Riley's 7th Mo. Report.]

ENEMIES:

212*a*. *Anthocoris insidiosus* (Say.)
[Adult: figure of adult from Riley's 2d Mo. Report.]

212*b*. *Harpactor cinctus* (Fabr.)
[Adult.]

212*c*. *Cycloneda sanguinea* (Linn.)
[Adult.]

212*d*. *Megilla maculata* (DeGeer.)
[Adult.]

REMEDIES: Kerosene emulsion; burning stalks; irrigation; ditching.

CHIEF ARTICLES: Walsh and Riley, Amer. Ent., vol. 1, p. 169–177, 194–199; Riley, 2d Rept. Ins. Mo., p. 15–37; 7th do., p. 19–71; Thomas, Bull. No. 5, U. S. Ent. Comm., pp. 44.

213. GRAIN LEAF-HOPPER.

Diedrocephala flaviceps Riley.

[Adults.]

214. DESTRUCTIVE LEAF-HOPPER.

Cicadula exitiosa Uhler.

[Adults: figure of the same from Comstock's Report for 1879.]

REMEDIES: Torches and trap-lanterns.

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1879, p. 191–193.

215. WHEAT PLANT-LOUSE.

Siphonophora avenæ (Fabr.)

[Injured wheat blades, adults.]

PARASITES:

215*a*. *Trioxys testaceipes* Cress.
[Adults.]

REMEDIES: Pyrethrum; soap-suds; weak lye; tobacco water.

216. NUTTALL'S BLISTER-BEETLE.

Cantharis nuttalli (Say.)

[Adults.]

217. AMERICAN MEROMYZA.

Meromyza americana Fitch.

[Injured wheat stalks, adult flies: figures of injured stalks, larva and pupa from Riley's 1st Mo. Report.]

REMEDIES: Destruction of infested stalks; rotation of crops.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 159–161; Lintner, 1st Rept. Ins. N. Y., p. 221–227; Forbes, 13th Rept. Ins. Ill., p. 13–29.

218. OSCINIS sp.

[Injured wheat and adult fly.]

219. CHLOROPS PROXIMA Say.

[Injured wheat, pupæ, adults.]

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1879, p. 257–258.

220. HESSIAN FLY.

Ceeidomyia destructor (Say.)

[Injured stalks of wheat, barley and rye; pupæ and adults: figures in all stages from Packard's Report.]

REMEDIES: Late planting; selection of wheat; rolling and pasturing to sheep.

CHIEF ARTICLE: Packard, Bull. No. 4, U. S. Ent. Comm., pp. 43.

221. STALK BORER.

Gortyna nitela Guen.

[Injured wheat stalks, larva, chrysalids and adult moths.]

See No. 199.

222. GRASS WORM.

Laphygma frugiperda Sm. & Abb.

Syn. *Prodenia autumnalis* Riley.

[Larvæ, chrysalids and adult moths.]

REMEDIES: Early plowing.

CHIEF ARTICLES: Riley, 3d Rept. Ins. Mo., p. 109–116; Amer. Ent., v. 2, p. 363–365.

223. WHEAT-HEAD ARMY-WORM.

Leucania albilinea Guen.

[Larva, chrysalis and adult moth: figures of eggs, larva and adult from Riley's 9th Mo. Report.]

PARASITES:

223*a*. *Tachina anonyma* Riley.

[Adult.]

223*b*. *Anomalon apicale* Cress.

[Adult.]

REMEDIES: Late plowing.

CHIEF ARTICLE: Riley, 9th Rept. Ins. Mo., p. 50–57.

224. BARLEY ISOSOMA.

Isosoma hordei (Harris.)

[Injured wheat stalk: figures of same, and of adults, from Amer. Ent.]

REMEDIES: Burning stubble.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 551–561; Walsh & Riley, Amer. Ent., v. 1, p. 149–158.

225. WHEAT ISOSOMA.

Isosoma tritici Riley.

[Injured wheat stalks, adults: figures of larva and adult with details of structure from Riley's Report for 1881.]

REMEDIES: Same as for No. 222.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1881, p. 183–187.

Injuring Stored Grains.

226. GRAIN WEEVIL.

Calandra remotepunctata Gyll.

[Injured wheat grains, adult beetles.]

REMEDIES: Same as for No. 201.

227. RICE WEEVIL.

Calandra oryzæ Linn.

[Injured wheat and barley, adult beetles.]

PARASITES:

227*a*. *Pteromalus calandræ* Howard.
[Adult.]

228. NATIVE MEAL-WORM.

Tenebrio obscurus Fabr.

[Larva, adult beetles: figures in all stages from LeBaron's 4th Ill. Report.]

229. IMPORTED MEAL-WORM.

Tenebrio molitor Linn.

[Larval skins, adult beetles.]

230. HYPOPHLŒUS DEPRESSUS Fabr.

[Adult beetles.]

231. DINODERUS PUSILLUS Fabr.

[Adult beetles.]

232. SITODREPA PANICEA (Linn.)

[Injured wheat, adults.]

233. TYPHÆNA FUMATA (Linn.)

[Adults.]

234. SILVANUS SURINAMENSIS (Linn.)

Adults.]

235. GRAIN MOTH.

Gelechia cerealella (Linn.)

[Injured wheat grains, adult moths.]

PARASITES:

235*a*. *Pteromalus* sp.

[Work.]

236. ASOPIA FARINALIS (Linn.)

[Injured wheat grains, chrysalis, adult moth.]

INSECTS AFFECTING COTTON.

(*Gossypium herbaceum.*)

Injuring the Stems and Branches.

237. ATAXIA CRYPTA (Say.)

[Adult beetle.]

238. MONOCREPIDIUS VESPERTINUS (Fabr.)

[Adult beetle.]

239. LEAF-CUTTING ANT.

Atta fervens (Drury.)

[Adult.]

Injuring the Leaves.

240. AMERICAN LOCUST.

Acridium americanum Drury.

[Adults.]

241. COTTON APHIS.

Aphis gossypii Glover.

[Adults: figures of larvæ and adults from Glover.]

PARASITES:

241*a*. *Trioxys testaceipes* Cress.

[Leaf showing work, adults.]

242. PROCONIA sp.

[Adults.]

243. PARIA VIRIDICYANEA Crotch.

[Adult beetles.]

244. ANOMŒA LATICLAVIA (Forst.)

[Adult beetles.]

245. COTTON WORM.

Aletia xylina Say.

[Injured leaves, larvæ, chrysalids, cocoons and adult moths: figures in all stages from Bull. 3, U. S. Ent. Comm.]

PARASITES:

245*a*. *Trichogramma pretiosa* Riley.
[Figures of adult with details of structure from the 4th Rept. U. S. Ent. Comm.]

Tachina fraterna Comstock.

245*b*. *Tachina aletiæ* Riley.
[Puparium, adult fly.]

245*c*. *Cyrtoneura stabulans* Fallen.
[Figures of all stages with details of structure from the 4th Rept. U. S. Ent. Comm.]

245*d*. *Sarcophaga sarraceniæ* Riley.
[Puparium, adult.]

245*e*. *Euplectrus comstockii* Howard.
[Parasitised larvæ, adults.]

245*f*. *Apanteles aletiæ* Riley.
[Figure of adult with details of structure from Riley's Notes on Microgasters.]

245*g*. *Chalcis ovata* Say.
[Adults.]

245*h*. *Pimpla conquisitor* (Say.)
[Adult.]

ENEMIES:

Oxyopes viridans Hentz.

245*i*. *Mantis carolina* Linn.
[Eggs and adult.]

245*j*. *Prionotus cristatus* (Linn.)
[Adult.]

245*k*. *Melanolestes picipes* H.–Sch.
[Adult.]

245*l*. *Stenopoda cinerea* Lap.
[Adult.]

245*m*. *Callida decora* (Fabr.)
[Adults.]

245*n*. *Galerita atripes* Lec.
[Adult.]

245*o*. *Helluomorpha texana* Lec.
[Adult.]

245*p*. *Tetracha virginica* Linn.
[Adult.]

245*q*. *Monomorium carbonarium* Smith.
[Adults.]

245*r*. *Solenopsis geminata* (Fabr.)
[Adults.]

245*s*. *Dorymyrmex flavus* McCook.
[Adult.]

245*t*. *Pelopœus cœruleus* Linn.
[Adult.]
245*u*. *Sphex pennsylvanica* Linn.
[Adult.]
245*v*. *Monedula carolina* Fabr.
[Adult.]
245*w*. *Polistes bellicosa* Cress.
[Adult.]
245*x*. *Vespa carolina* Drury.
[Adult.]

REMEDIES: Arsenical mixtures.

CHIEF ARTICLES: Riley, 6th Rept. Ins. Mo., p. 17–24; Bull. No. 3, Ent. Comm., Washington, 1880, p. 144; Comstock, Rept. Cotton Ins., Washington, 1879, pp. 511.

246. ANOMIS EXACTA (?) Hübn.

[Adult moth: figures of the early stages and adults of an allied species from 4th Rep. U. S. E. C.]

247. PRODENIA COMMELINÆ Sm. & Abb.

[Larva, adult moths.]

248. PRODENIA FLAVIMEDIA Haw.

[Larva, adult moths.]

249. COMMON YELLOW BEAR.

Spilosoma virginica (Fabr.)

[Larva, chrysalids, cocoons and adult moths.]

PARASITES:

249*a*. *Tachina* sp.
[Puparium, adult.]

CHIEF ARTICLE: Riley, 3d Rept. Ins. Mo., p. 68–69.

250. IMPERIAL MOTH.

Eacles imperialis (Drury.)

[Adult moths.]

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 402–405.

251. IO MOTH.

Saturnia io (Fabr.)

[Eggs, chrysalis, cocoons and adult moths.]

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 393–396; Riley, 5th Rept. Ins. Mo., p. 133.

252. ABBOT'S BAG-WORM.

Oiketicus abbotii Grote.

[Case.]

253. BASKET-WORM; BAG-WORM.

Thyridopteryx ephemeræformis (Haw.)

[Case, moths.]

REMEDIES: Arsenical mixtures; burning bags in winter.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 147; Walsh & Riley, Amer. Ent., v. 2, p. 35–38.

254. GREAT LEOPARD MOTH.

Ecpantheria scribonia (Stoll.)

[Larva, adult moths.]

CHIEF ARTICLE: Riley, 4th Rept. Ins. Mo., p. 141.

Injuring the Boll.

255. LEAF-FOOTED PLANT-BUG.

Leptoglossus phyllopus (Linn.)

[Adults.]

256. BOLL-WORM.

Heliothis armigera Hübn.

[Injured bolls, larva, adult moths: figures in all stages from Report Dept. Agric. for 1882.]

PARASITES:

Tachina alectæ Riley.
Tachina anonyma Riley.

REMEDIES: Pyrethrum; arsenical mixtures.

CHIEF ARTICLES: Riley, 3d Rept. Ins. Mo., p. 104–109; Rept. Dept. Agric., 1881, p. 145–152; Lintner, 1st Rept. Ins., N. Y., p. 116–126.

257. COTTON STAINER.

Dysdercus suturellus H.-Schf.

[Larva, pupa, adults.]

REMEDIES: Pyrethrum; kerosene emulsion.

CHIEF ARTICLES: Same as for No. 69.

INSECTS AFFECTING GRASS.

(*Gramineæ.*)

258. SPHENOPHORUS PARVULUS Gyll.

[Adult beetles.]

259. FIG-EATER.

Allorhina nitida (Linn.)

[Larva, adult beetles: figures of early stages and adult beetle with details of structure from Le Baron's 4th Ill. Report.]

260. WHITE GRUB; JUNE BEETLE.

Lachnosterna fusca (Fröhl.)

Syn. *Lachnosterna quercina* (Knoch.)

[Adult beetle.]

REMEDIES: Same as for No. 86.

CHIEF ARTICLE: Same as for No. 86.

261. TIPULA TRIVITTATA Say.

[Pupa, adult.]

262. VAGABOND CRAMBUS.

Crambus vulgivagellus Clem.

[Injured blades, eggs, larva, adult moths: figures in all stages from Riley's Report for 1881.]

PARASITES:

262*a*. *Lampronota frigida* Cress.
[Adults.]

REMEDIES: Rolling and burning.

CHIEF ARTICLES: Riley, Rept. Dept. Agric., 1881, p. 179–183; Lintner, 1st Rept. Ins. N. Y., p. 127–149.

263. HOMOPTERA EDUSA (Drury.)

[Adult moth.]

264. DRASTERIA ERECHTEA (Cram.)

[Eggs, larvæ, chrysalids, cocoons and adult moths.]

265. GRASS-WORM.

Laphygma frugiperda Sm. & Abb.

Syn. *Prodenia autumnalis* Riley.

[Larvæ, chrysalis and adult moths: figures of larva and moth with details of structure from Riley's 8th Mo. Report.]

PARASITES:

265*a*. *Tachina* sp.
[Adults.]

265*b*. *Microgaster* sp.
[Adults.]

REMEDIES: See No. 185.

CHIEF ARTICLE: See No. 185.

266. AGROTIS ANNEXA Tr.

[Injured grass root, adult moth.]

267. AGROTIS C-NIGRUM (Linn.)

[Larvæ, chrysalids, adults.]

268. ARMY-WORM.

Leucania unipuncta Haw.

[Specimen showing injuries, larvæ, chrysalids, cocoons and adult moths: figures in all stages from the Report Dept. Agric. for 1882.]

PARASITES:

268*a*. *Nemorœa leucaniæ* (Kirkp.)
[Adult fly: figure of the same from Riley's 2d Mo. Report.]

268*b*. *Exorista flavicauda* Riley.
[Parasitised larvæ, puparium, adult fly: figure of fly from Riley's 2d Mo. Report.]

268*c*. *Apanteles congregatus* (Say.)
[Adults: figure of the same from Riley's 2d Mo. Report.]

268*d*. *Mesochorus vitreus* Walsh.
[Cocoons, adults: figure of adults from Riley's 2d Mo. Report.]

268*e*. *Pezomachus minimus* Walsh.
[Figure of adult from Riley's 2d Mo. Report.]

268*f*. *Ichneumon flavozonatus* Cress.
[Adults.]

268*g*. *Ophion purgatus* Say.
[Adult.]

ENEMIES:

268*h*. *Uropoda americana* Riley.
[Figures from Riley's 9th Mo. Report.]

268*i*. *Metapodius femoratus* (Fabr.)
[Adult.]

268*j*. *Anisodactylus rusticus* Dej.
[Adult.]

268*k*. *Harpalus pennsylvanicus* (DeGeer.)
[Adult.]

268*l*. *Harpalus caliginosus* (Fabr.)
[Adults.]

268*m*. *Selenophorus pedicularius* (Dej.)
[Adult.]

268*n*. *Cratacanthus dubius* (Beauv.)
[Adult.]

268*o*. *Amara angustata* (Say.)
[Adult.]

268*p*. *Pasimachus elongatus* Lec.
[Adult.]

268*q*. *Calosoma calidum* (Fabr.)
[Adult: figure of larva from Riley's 1st Mo. Report.]

268*r*. *Calosoma willcoxi* Lec.
[Adult.]

268*s*. *Calosoma scrutator* (Fabr.)
[Adult.]

268*t*. *Calosoma externum* Say.
[Adult.]

268*u*. *Elaphrus ruscarius* Say.
[Adult.]
268*v*. *Cicindela repanda* Dej.
[Adults.]

REMEDIES: Burning over fields in winter; ditching; arsenical mixtures.

CHIEF ARTICLES: Riley, 2d Rept. Ins. Mo., p. 37–56; 8th do., p. 22–56, 182–185; 9th do., p. 47–50; Bull. No. 3, Dept. Agric., p. 9–23; Rept. Dept. Agric., 1881, p. 89–106; Comstock, Rept. Dept. Agric., 1879, p. 187–191.

269. ARCTIA NAIS Drury.

[Injured grass blades, larva, chrysalis and adult moths.]

270. ISABELLA TIGER MOTH.

Pyrrharctia isabella (Sm. & Abb.)

[Larvæ, adult moths.]

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 355; Riley, Rept. Ins. Mo., p. 143.

271. SALT-MARSH CATERPILLAR.

Leucarctia acræa (Drury.)

[Adult moths.]

REMEDIES: Rolling; submersion.

CHIEF ARTICLE: Harris, Ins. Inj. to Veg., p. 351–355.

272. GRAIN MOTH.

Gelechia cerealella Linn.

[Injured timothy, adult moths.]

273. CAROLINA LOCUST.

Oedipoda carolina (Linn.)

[Adults.]

274. AMERICAN LOCUST.

Acridium americanum Drury.

[Adults.]

275. ATLANTIC LOCUST.

Caloptenus atlanis Riley.

[Adults.]

276. DIFFERENTIAL LOCUST.

Caloptenus differentialis Uhler.

[Adults.]

INSECTS AFFECTING THE CLOVER

(*Trifolium.*)

Injuring the Roots.

277. CLOVER ROOT-BORER.

Hylesinus trifolii Müll.

[Injured root, adult beetles: figures of injuries and insect in all stages from Riley's Report for 1878.]

ENEMIES:

277*a*. *Telephorus bilineatus* (Say.)
[Adult beetle.]

REMEDIES: Plowing under in the spring of the second year.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1878, p. 43–45.

Injuring the Stems.

278. CLOVER STEM-BORER.

Languria mozardi Latr.

[Injured stems, adult beetles: figures of all stages from Comstock's Report for 1879.]

REMEDIES: Early summer followed by a fall cutting.

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1879, p. 199–200.

Injuring the Leaves.

279. CLOVER ALEURODES.

Aleurodes sp.

[Leaves with adults.]

280. CLOVER LEAF-BEETLE.

Phytonomus punctatus (Fabr.)

[Injured leaves, larva, cocoon, and adult beetles: figures of work and beetle in all stages with details of structure from Riley's Report for 1881.]

ENEMIES:

280*a*. *Collops quadrimaculatus* (Fabr.)
[Adult.]

REMEDIES: Plowing under in May.

CHIEF ARTICLES: Riley, Rept. Dept. Agric., 1881, p. 171–179; Lintner, 1st Rept. Ins. N. Y., p. 247–253.

281. GRAPE-VINE COLASPIS.

Colaspis brunnea Fabr.
Syn. *Colaspis flavida* (Say.)

[Injured leaf, adult beetles.]

See No. 150.

282. CLOVER-LEAF MIDGE.

Cecidomyia trifolii Loew.

[Injured leaves, pupæ, cocoons and adult flies: figures of early stages and adults from Comstock's Report for 1879.]

CHIEF ARTICLES: Comstock, Rept. Dept. Agric., 1879, p. 197–199; Lintner, Ins. of Clover Plant, p. 11–15.

283. RUSTY-BROWN TORTRIX.

Platynota flavedana Clem.

[Eggs, chrysalis and adult moths.]

PARASITES:

283*a*. *Microgaster zonaria* (Say.)
[Adult.]

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1880, p. 257–258.

284. SULPHUR-COLORED TORTRIX.

Dichelia sulfureana (Clem.)

[Injured leaves, larva, chrysalids, adult moths.]

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1880, p. 255–256.

285. CLOVER BOTIS.

Eurycreon rantalis Guen.
Syn. *Botis communis* Grote.

[Injured leaves, eggs, adult moths.]

286. GREEN CLOVER-WORM.

Hypena scabra Fabr.

[Chrysalids, adult moths.]

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1879, p. 252.

287. SMALL WHITE BRISTLY CUT-WORM.

Mamestra renigera (Steph.)

[Larva, chrysalis, adult moth.]

REMEDIES: Baits of clover poisoned with Paris Green.

CHIEF ARTICLE: Riley, 1st Rept. Ins. Mo., p. 86–87.

288. UNARMED RUSTIC: VARIEGATED CUT-WORM.

Agrotis saucia Treit.

Syn. *Agrotis inermis* Harris.

[Larva, adult moth: figures of eggs from Riley's 8th Mo. Report.]

PARASITES:

288*a*. *Tachina* sp.

[Puparium, adult fly.]

REMEDIES: Same as for No. 287.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 444; Riley, 1st Rept. Ins. Mo., p. 72–74.

289. SMEARED DAGGER.

Acronycta oblinita Sm. & Abb.

[Larvæ, cocoons and adult moths: figures of the same from Riley's 3d Mo. Report.]

PARASITES:

289*a*. *Tachina* sp.

[Parasitised chrysalis, adult fly.]

289*b*. *Polysphincta* sp.

[Parasitised larva, adults.]

289*c*. *Alciodes rileyi* Cress.

[Adult: figure of parasitised larva from Riley's 3d Mo. Report.]

289*d*. *Ichneumon unifasciatorius* Say.

[Adult.]

REMEDIES: Hand-picking.

CHIEF ARTICLE: Riley, 3d Rept. Ins. Mo., p. 70–72.

290. CROCOTA RUBICUNDARIA Hübn.

[Chrysalids and adult moths.]

291. YELLOW BUTTERFLY.

Colias philodice Godt.

[Larva, chrysalids and adults.]

PARASITES:

291*a*. *Mesochorus scitulus* Cress.

[Cocoon and adult.]

292. COMYNTAS BUTTERFLY.

Lycæna comyntas Godt.

[Eggs, chrysalids and adults.]

Injuring the Flowers and Seeds.

293. CLOVER-SEED MIDGE.

Cecidomyia leguminicola Lint.

[Larva, cocoons and adult flies: figures of larva and adult with details of structure from Riley's Report for 1878.]

CHIEF ARTICLES: Lintner, Rept. N. Y. Agric. Soc., 1878, p. 62–64; Riley, Rept. Dept. Agric., 1878, p. 250–252; Comstock, ibid., 1879, p. 193–196.

294. CLOVER-SEED WORM.

Grapholitha interstinctana (Clem.)

[Work, chrysalis and adult moths.]

PARASITES:

294*a*. *Phanerotoma tibialis* Hald.

[Cocoon, adult.]

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1880, p. 254–255.

295. CLOVER-HAY WORM.

Asopia costalis (Fabr.)

[Larva, moth: figures of all stages from Riley's 6th Mo. Report.]

PREVENTIVES: Salting; clean ricks.

CHIEF ARTICLE: Riley, 6th Rept. Ins. Mo., p. 102–107.

INSECTS AFFECTING THE PEA.

(*Pisum sativum.*)

296. PEA WEEVIL.

Bruchus pisi Linn.

[Injured peas, adult beetles: figures of injured pea, early stages and adult beetle from Riley's 3d Mo. Report.]

PREVENTIVES: Keeping seed over to second year; bisulphide of carbon in tight vessels.

CHIEF ARTICLE: Riley, 3d Rept. Ins. Mo., p. 44–50.

INSECTS AFFECTING THE BEAN.

(*Phaseolus.*)

297. NUTTALL'S BLISTER-BEETLE.

Cantharis nuttalli (Say.)

[Adults.]

298. AMERICAN BEAN-WEEVIL.

Bruchus fabæ Riley.

[Injured beans, adult beetles: figures of injured bean and adult beetle from Riley's 3d Mo. Report.]

REMEDIES: Bisulphide of carbon.

CHIEF ARTICLE: Riley, 3d Rept. Ins. Mo., p. 52–56.

299. DISTENDED MAY-BEETLE.

Lachnosterna fareta (Lec.)

[Adults.]

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1880, p. 247–248.

300. CORN WORM: BOLL WORM.

Heliothis armigera Hübn.

[Injured beans, larva and adult moth: figures of all stages from Riley's 3d Mo. Report.]

See No. 256.

301. ROLLER WORM.

Eudamus proteus (Linn.)

[Larva, chrysalids and adult butterfly.]

REMEDIES: Hand-picking.

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1880, p. 269–270.

INSECTS AFFECTING THE CABBAGE AND CAULIFLOWER.

(*Brassica oleracea.*)

302. CABBAGE APHIS.

Aphis brassicæ Linn.

[Leaf showing injury, adults.]

PARASITES:

302*a*. *Trioxys piceus* Cress.

[Leaf showing work of parasite, adults.]

REMEDIES: Kerosene emulsion.

303. HARLEQUIN CABBAGE BUG.

Murgantia histrionica (Hahn.)

[Eggs, larvæ, pupæ, adults: figures of the same from Riley's 4th Mo. Report.]

REMEDIES: Pyrethrum.

CHIEF ARTICLES: Riley, 4th Rept. Ins. Mo., p. 35–38; Lintner, 1st Rept. Ins. N. Y., p. 264–271.

304. CABBAGE ANTHOMYIA.

Anthomyia brassicæ Bouché.

[Adult flies.]

REMEDIES: Bisulphide of carbon; kerosene emulsion.

CHIEF ARTICLE: Lintner, 1st Rept. Ins. N. Y., p. 184–191.

305. CABBAGE PLUTELLA.

Plutella cruciferarum Zeller.

[Injured leaf, adult moths: figures in all stages with details of structure from Riley's Report for 1883.]

PARASITES:

305*a*. *Limneria annulipes* Cress.

[Cocoons, adults.]

REMEDIES: Pyrethrum; kerosene emulsion.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1883, p. 129–130.

306. CAULIFLOWER BOTIS.

Botis repetitalis Grote.

[Chrysalis, adult moth: figures of larva and moth from Riley's Report for 1883.]

REMEDIES: Same as for No. 305.

CHIEF ARTICLES: Comstock, Rept. Dept. Agric., 1880, p. 270; Riley, ibid., 1883, p. 128–129.

307. CABBAGE PIONEA.

Pionea rimosalis (Guen.)

[Larva, adult moth: figures of all stages from Riley's Report for 1883.]

PARASITES:

307*a*. *Apanteles congregatus* (Say.)

[Cocoons, adults: figures of adults from Riley's 2d Mo. Report.]

REMEDIES: Same as for No. 305.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1883, p. 126.

308. CABBAGE PLUSIA.

Plusia brassicæ Riley.

[Eggs, larvæ, chrysalids, cocoons and adult moths: figures of early stages and moth from Riley's 2d Mo. and 1883 Reports.]

PARASITES:

308*a*. *Copidosoma truncatellum* Dalm.

[Figure of parasitised larva of *P. brassicæ* and of the adult parasite from Riley's Report for 1883.]

308*b*. *Apantcles congregatus* (Say.)

[Adults.]

308*c*. *Pimpla conquisitor* (Say.)

[Parasitised chrysalis of *P. brassicæ*, adult parasite.]

REMEDIES: Same as for No. 305.

CHIEF ARTICLES: Riley, 2d Rept. Ins. Mo., p. 110–112; Rept. Dept. Agric., 1880, p. 119–122.

309. GRASS WORM.

Laphygma frugiperda Sm. & Abb.

Syn. *Prodenia autumnalis* Riley.

[Chrysalis and adult moths.]

See No. 265.

310. ZEBRA CATERPILLAR.

Mamestra picta Harris.

[Larva, chrysalis and adult moth: figures of larva and adult moth from Riley's 2d Mo. and 1883 Reports.]

REMEDIES: Same as for No. 305.

CHIEF ARTICLES: Riley, 2d Rept. Ins. Mo., p. 112–113; Rept. Dept. Agric., 1883, p. 124–125.

311. CABBAGE MAMESTRA.

Mamestra chenopodii Albin.

[Adult moths: figures in all stages with details of structure from Riley's Report for 1883.]

REMEDIES: Same as for No. 305.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1883, p. 123–124.

312. WESTERN STRIPED CUT-WORM.

Agrotis subgothica Haw.

[Larva of an allied species, adult moth,]

REMEDIES: Same as for No. 287.

CHIEF ARTICLE: Riley, 1st Rept. Ins. Mo., p. 81–82.

313. SALT-MARSH CATERPILLAR.

Leucarctia acræa (Drury.)

[Larva, cocoons and adult moths.]

See No. 271.

314. IMPORTED CABBAGE-WORM.

Pieris rapæ Sch.

[Larvæ, chrysalis, adult butterflies: figures of early stages and butterflies from Riley's Report for 1883.]

PARASITES:

314*a*. *Pteromalus puparum* Linn.

[Adults.]

ENEMIES:

314*b*. *Phymata erosa* (Fabr.)

[Adult: figures of the same from Riley's Report for 1883.]

REMEDIES: Same as for No. 305.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1883, p. 108–113.

315. POT-HERB BUTTERFLY.

Pieris oleracea Boisd.

[Chrysalis and butterflies: figure of chrysalis from Riley's 2d Mo. Report.]

REMEDIES: Same as for No. 305.

CHIEF ARTICLES: Riley, 2d Rept. Ins. Mo., p. 105–106; Rept. Dept. Agric., 1883, p. 115–117.

316. SOUTHERN CABBAGE BUTTERFLY.

Pieris protodice Boisd.

[Larva, chrysalis, adult butterfly.]

REMEDIES: Same as for No. 305.

CHIEF ARTICLES: Riley, 2d Rept. Ins. Mo., p. 104–105; Rept. Dept. Agric., 1883, p. 114–115.

317. LARGE CABBAGE BUTTERFLY.

Pieris monuste Linn.

[Larvæ, chrysalis and adult butterflies.]

REMEDIES: Same as for No. 305.

CHIEF ARTICLE: Riley, Rept. Dept. Agric., 1883, p. 117–118.

INSECTS AFFECTING THE SWEET POTATO.

(*Ipomœa batatas.*)

Injuring the Roots.

318. SWEET POTATO ROOT-BORER.

Cylas formicarius (Fabr.)

[Injured roots, adult beetles: figure of beetle from Comstock's Report for 1879.]

CHIEF ARTICLE: Comstock, Rept. Dept. Agric., 1879, p. 249–250.

Injuring the Leaves.

319. MOTTLED TORTOISE-BEETLE.

Coptocycla guttata (Oliv.)

[Larva, pupa, adult beetles: figures of early stages and beetle from Riley's 2d Mo. Report.]

REMEDIES: Arsenical mixtures.

CHIEF ARTICLE: Riley, 2d Rept. Ins. Mo., p. 63.

320. GOLDEN TORTOISE-BEETLE.

Coptocycla aurichalcea (Fabr.)

[Injured leaves, pupæ and adult beetles: figures of all stages from Riley's 2d Mo. Report.]

REMEDIES: Same as for No. 319.

CHIEF ARTICLE: Riley, 1st Rept. Ins. Mo., p. 62.

321. TWO-STRIPED SWEET-POTATO BEETLE.

Cassida bivittata Say.

[Adult beetles: figures of early stages and adult beetle from Riley's 2d Mo. Report.]

REMEDIES: Same as for No. 319.

CHIEF ARTICLE: Riley, 2d Rept. Ins. Mo., p. 61–62.

322. BLACK-LEGGED TORTOISE-BEETLE.

Cassida nigripes Oliv.

[Adult beetle: figures of early stages and adult beetle from Riley's 2d Mo. Report.]

REMEDIES: Same as for No. 319.

CHIEF ARTICLE: Riley, 2d Rept. Ins. Mo., p. 63–64.

323. LARGE SWEET-POTATO BEETLE.

Physonota unipunctata (Say.)

Syn. *P. quinquepunctata* W. & R.

[Adult beetles.]

324. SWEET-POTATO SPHINX.

Macrosila cingulata (Fabr.)

[Larva, chrysalis and adult moth.]

INSECTS AFFECTING THE POTATO.

(*Solanum tuberosum.*)

Injuring the Stems.

325. RINGED MILLEPEDE.

Cambala annulata (Say.)

Syn. *Julus multistriatus* Walsh.

[Adults: figure of same from Prac. Ent.]

REMEDIES: Luring with cut potatoes previously poisoned.

CHIEF ARTICLE: Walsh, Prac. Ent., v. 2, p. 34–35.

326. POTATO-STALK WEEVIL.

Trichobaris trinotatus (Say.)

[Adult beetles: figures of early stages and beetle from Riley's 1st Mo. Report.]

REMEDIES: Burning vines when they first wilt.

CHIEF ARTICLE: Riley, 1st Rept. Ins. Mo., p. 93–95.

Injuring the Leaves.

327. ASH-GRAY BLISTER-BEETLE.

Macrobasis unicolor (Kirby.)

Syn. *Macrobasis fabricii* (Lec.)

[Adult beetles: figures of the same with details of structure from Riley's 1st Mo. Report.]

REMEDIES: Arsenical mixtures; pyrethrum; driving and burning.

CHIEF ARTICLE: Riley, 1st Rept. Ins. Mo., p. 97–98.

328. EPICAUTA CORVINA Lec.

[Adult beetle.]

329. BLACK BLISTER-BEETLE.

Epicauta pennsylvanica (DeGeer.)

[Adult beetles.]

REMEDIES: Same as for No. 327.

CHIEF ARTICLE: Riley, 1st Rept. Ins. Mo., p. 98.

330. MARGINED BLISTER-BEETLE.

Epicauta cinerea (Forst.)

Syn *Epicauta marginata* (Fabr.)

[Adult beetles: figure of the same from Riley's 1st Mo. Report.]

REMEDIES: Same as for No. 327.

CHIEF ARTICLE: Riley, 1st Rept. Ins. Mo., p. 98–99.

331. STRIPED BLISTER-BEETLE.

Epicauta vittata (Fabr.)

[Adult beetles: figures of eggs and various stages of the larvæ from Riley in 1st Rept. U. S. Ent. Comm.]

REMEDIES: Same as for No. 327.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 96–97; 1st Rept. U. S. Ent. Comm., p. 293–302.

332. POTATO TORTOISE-BEETLE.

Coptocycla clavata (Fabr.)

[Adult beetle: figure of the same from Riley's 2d Mo. Rept.]

333. THREE-LINED POTATO-BEETLE.

Lema trilineata (Oliv.)

[Adult beetles: figures of all stages from Riley's 1st Mo. Report.]

CHIEF ARTICLE: Riley, 1st Rept. Ins. Mo., p. 99–100.

334. BOGUS POTATO-BEETLE.

Doryphora juncta Germ.

[Larva, adult beetles: figures of early stages and adult beetle from Riley's 1st Mo. Report.]

335. COLORADO POTATO-BEETLE.

Doryphora 10-*lineata* Say.

[Eggs, larvæ and adult beetles: figures in all stages from Riley's 1st Mo. Report.]

PARASITES:

335*a*. *Exorista doryphoræ* (Riley.)
[Figure of adult fly from Riley's 1st Mo. Report.]

ENEMIES:

335*b*. *Uropoda americana* Riley.
[Figure of beetle infested with mites and of the mite with details of structure.]

335*c*. *Reduvius raptatorius* Say.
[Adults.]

335*d*. *Harpactor cinctus* (Fabr.)
[Adult.]

335*e*. *Stiretrus fimbriatus* (Say.)
[Adult.]

335*f*. *Podisus cynicus* (Say.)
[Adult.]

335*g*. *Podisus spinosus* Dallas.
[Adult.]

335*h*. *Coccinella* 9-*notata* Herbst.
[Adult.]

335*i*. *Cycloneda sanguinea* (Linn.)
[Adult.]

335*j*. *Hippodamia convergens* Guér.
[Adult.]

335*k*. *Hippodamia glacialis* (Fabr.)
[Adult.]

335*l*. *Megilla maculata* DeGeer.
[Adult.]

335*m*. *Philonthus* sp.
[Adult.]

335*n*. *Lebia grandis* Hentz.
[Adult.]

335*o*. *Tetracha virginica* (Linn.)
[Adult.]

335*p*. *Proctacanthus milberti* Macq.
[Adult.]

335*q*. *Polistes rubiginosus* St. Farg.
[Adult.]

REMEDIES: Arsenical mixtures; pyrethrum.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 101–108; 3d do., p. 97–101; 4th do., p. 5–22; 5th do., p. 52–54; 6th do., p. 11–16; 7th do., p. 1–19; 8th do., p. 1–12; 9th do., p. 34–37; Potato Pests, N. Y., 1876, pp. 108.

INSECTS AFFECTING THE TOMATO.

(*Lycopersicum esculentum.*)

336. CABBAGE PLUSIA.

Plusia brassicæ Riley.

[Larva, chrysalis, adult moth.]

See No. 308.

337. STALK BORER.

Gortyna nitela Guen.

[Larva and adult moths.]

REMEDIES: Burning of infested stalks.

CHIEF ARTICLES: Riley, 1st Rept. Ins. Mo., p. 92–93; Lintner, 1st Rept. Ins. N. Y., p. 110–116.

338. BOLL WORM.

Heliothis armigera Hübn.

[Larva and adult moth: figure of larva showing injury done tomato from Riley's 3d Mo. Rept.]

See No. 200.

339. TOMATO WORM.

Macrosila 5-maculata Haw.

[Larva, chrysalis and adult moth.]

REMEDIES: Hand-picking.

CHIEF ARTICLES: Harris, Ins. Inj. to Veg., p. 320–321; Riley, 1st Rept. Ins., Mo., p. 95–96.

INSECTS AFFECTING THE TOBACCO.

(*Nicotiana tabacum.*)

Injuring the Leaves.

340. TOBACCO WORM.

Macrosila carolina Linn.

[Larva, chrysalids and adult moths.]

PARASITES:

340*a*. *Tachina* sp.

[Puparium and adult flies.]

340*b*. *Apanteles congregatus* (Say.)

[Cocoons and adults, parasitised larvæ with attached cocoons: figures of adult from Riley's 2d Mo. Rept.]

REMEDIES: Hand-picking.

Injuring Manufactured Tobacco.

341. SITODREPA PANICEA (Linn.)

[Adult beetles.]

342. LASIODERMA SERRICORNE (Fabr.)

[Injured cigarette, adult beetles.]

INSECTS AFFECTING THE ASPARAGUS.

(*Asparagus officinalis.*)

Injuring the Leaves.

343. ASPARAGUS BEETLE.

Crioceris asparagi (Linn.)

[Adult beetles: figures of all stages from Amer. Ent. and Comstock's Report for 1879.]

REMEDIES: Dusting with lime; arsenical mixtures.

CHIEF ARTICLES: Walsh and Riley, Amer. Ent., v. 1, p. 114–115; Lintner, 1st Rept. Ins. N. Y., p. 239–246; Comstock, Rept. Dept. Agric., 1879, p. 216–218.

INSECTS AFFECTING THE ONION.

(*Allium cepa.*)

344. IMBRICATED SNOUT-BEETLE.

Epicærus imbricatus (Say.)

[Adult beetles: figures of the same from Riley's 3d Mo. Report.]

REMEDIES: Hand-picking.

CHIEF ARTICLES: Riley, 3d Rept. Ins. Mo., p. 58; Comstock, Rept. Dept. Agric., 1879, p. 249.

345. IMPORTED ONION-FLY.

Anthomyia ceparum Meigen.

[Figures of larvæ and adult fly from Prac. Ent.]

REMEDIES: Bisulphide of carbon.

CHIEF ARTICLE: Lintner, 1st Rept. Ins. N. Y., p. 172.

INSECTS AFFECTING STOCK.

(*Horses, Cattle and Sheep.*)

346. HORSE BOT.

Gastrophilus equi (Fabr.)

[Eggs, larvæ, puparium and adult Bot.]

347. CATTLE TICK.

Ixodes bovis Linn.

[Adult ticks.]

348. OX BOT.

Hypoderma bovis DeGeer.

[Full grown bots.]

349 SHEEP BOT.

Oestrus ovis Linn.

[Larva, puparium and adult Bot; figures of all stages from Riley's 1st Mo. Report.]

INSECTICIDES.

Insecticides of leading importance are shown in this collection. The method in which each one is mixed or applied is generally stated under its name.

350. ACETIC ACID.

In dilution to about 10 to 15 per cent. of the acid. It is applied as a spray.

Arsenical Mixtures.

For fuller particulars see Bull. 3, U. S. Ent. Comm. on the Cotton Worm; the report of the Department on the same subject, and the reports of the Entomologist since 1878.

351. ARSENIC.

The White Arsenic as a powder is mixed in baits for destroying insects. It is also used on field crops. To 20 lbs. of flour ½ lb. of arsenic is added and thoroughly mixed. This is then applied by a sifter or blower. A solution of 8 ounces in 40 to 80 gallons of water may be sprayed.

Arsenic scalds the plants to such an extent that one of the two following is generally preferred.

352. LONDON PURPLE.

To 20 lbs. flour from ¼ to ½ lb. is added and well mixed. This is applied by a sifter or blower. With 40 gals. water ¼ to ½ lb. is mixed for spraying.

353. PARIS GREEN.

With 20 lbs. flour from ¾ to 1 lb. is mixed, and applied by sifting or by a blower. The same amount to 40 gals. water is used as a spray.

354. PARIS GREEN—Adulterated.

This is to be avoided. It is quite commonly sold by the trade. Its color is generally lighter than the pure green.

355. ASHES.

Wood ashes sifted on or placed around the bases of plants.

356. BENZINE.

This is used in cabinets or confined with household goods. Enough is applied to make its odor as strong as possible.

357. BISULPHIDE OF CARBON.

For use in the ground, a quantity is poured or injected among roots that are being injured. Against insects injuring stored grain or museum material a small quantity is used in an air-tight vessel.

358. BORAX.

The powder or a strong solution is applied in crevices or on surfaces requented by roaches, &c., to drive them away.

359. CAMPHOR.

As a preventive this is confined in drawers and packages, to protect dry goods and specimens.

360. CARBOLIC ACID.

A solution of one part in 100 of water is used against parasites on domestic animals and in their houses; also on the surfaces of plants and among roots in the ground.

361. COAL TAR.

Painted on tree trunks, &c., to catch or prevent insects from mounting. By a few quarts in a barrel of water a solution is made to sprinkle plants as a preventive. In 1 gal. water 1 qt., is dissolved [with heat] to form a stronger solution, for use in the ground among roots and on the foliage. The smoke from burning coal tar is used as a repellant.

362. COPPERAS.

In 1 barrel of water 5 lbs. are dissolved as a solution to sprinkle on plants.

363. CREOSOTE.

Used like carbolic acid.

364. HELLEBORE.

The powder is sifted on alone or mixed 1 part to 20 of flour. With 1 gal. water ¼ lb. is mixed, as a liquid to be sprayed.

365. LIME.

The dry lime is sifted on, or, as whitewash, is applied by a brush.

366. LYE.

In 1 gal. water 1 lb. of concentrated lye is dissolved as a solution to spray on trees.

367. NAPHTHALINE.

Used in the ground around roots that are attacked by insects and in cabinets to prevent pests.

368. OIL OF COTTON.

Rubbed on domestic animals against parasites.

369. OIL OF TURPENTINE.

Applied on the bark of trees and on live-stock suffering from parasites.

370. PETROLEUM—Crude.

371. PETROLEUM—Refined.

Of the Crude or Refined 2 tablespoonfuls in a bucket of water are mixed and constantly stirred while being sprayed.

The following emulsions are preferable:

372. PETROLEUM—Milk Emulsion.

To one part milk add two parts of kerosene and churn by a force-pump or other agitator. The butter-like emulsion is diluted *ad libitum* with water. For fuller particulars see late Reports and Bulletins of the Entomologist.

373. PETROLEUM—Soap Emulsion.

In 1 gal. hot water ½ lb. of whale-oil soap is dissolved. This, instead of milk, is mixed to an emulsion with kerosene, in the same manner and proportions as just stated.

374. PYRETHRUM FLOWERS—Dalmatian.

From these the Buhach of Mr. G. N. Milco, Stockton, Cal., and the Dalmatian insect powders are made. Species, *P. cinerariæfolium*.

375. PYRETHRUM POWDER OF THE FLOWERS—Dalmatian, *P. cinerariæfolium or California Buhach Powder.*

This is blown or sifted on dry, also applied in water, 1 gal. to a tablespoonful of the powder, well stirred and then sprayed.

376. PYRETHRUM POWDER OF STEMS—Dalmatian.

Used like the preceding, but not so good.

377. PYRETHRUM POWDER—Adulterated.

This is sold quite extensively by the trade, and should be avoided as being poor, often worthless.

378. PYRETHRUM FLOWERS—Persian.

From these the Persian powder is derived. Species, *P. roseum*.

379. PYRETHRUM POWDER OF THE FLOWERS—Persian,

P. roseum, or Persian Insect Powder. Used as just stated above.

380. PYRETHRUM POWDER OF THE STEMS—Persian.

Used like the preceding, but not so good.

381. SALT—Common.

A strong solution is sometimes used as a spray, more often applied in crystal to the ground as a preventive dressing.

382. SALTPETRE.

Used the same.

383. SOAP—Soft.

This is rubbed on the trunks of trees to protect from, or to kill, insects.

384. SOAP, COMMON—Bar.

Used the same as 383 and as suds.

385. SOAP—Whale Oil.

Used the same as 383, but better.

386. SOAP SUDS.

A strong solution of either of the soaps. Employed as a wash or spray for preventing or destroying soft-bodied insects.

387. SULPHUR POWDER.

Sifted or blown onto plants. The smoke is also used to fumigate.

388. SULPHOCARBONATE OF POTASSIUM.

Applied in holes or trenches to destroy root-feeding insects like the Grape *Phylloxera*.

389. QUASSIA.

A strong decoction is useful against soft-bodied insects.

390. TOBACCO—Decoction.

This is made as strong as possible as a wash or spray to kill insect pests on animals or plants.

INSECTICIDE MACHINERY AND APPLIANCES FOR PROTECTING CROPS FROM INSECT RAVAGES.

Spray-Pumps

For Applying Poison Solutions to Destroy Insects.

Hydronettes, &c.

These are worked between the two hands, are light, easily directed, and may be used from a wagon, on horseback, or while standing.

391. HYDRONETTE.
R. T. Deakin, Philadelphia, Pa.

391a. HYDRONETTE.
R. T. Deakin, Philadelphia, Pa.

392. HYDRONETTE.
Rumsey & Co., Seneca Falls, N. Y.

The above three pumps are all double-acting and throw a constant spray.

393. FOUNTAIN PUMP.
J. A. Whitman, Providence, R. I.

A single-acting pump, and throws the spray by interrupted spurts.

394. SYRINGE SPRAYER.
G. H. Hull, Montello, Wis.

A common tin spray-syringe, but is surrounded by a receptacle for the poison.

395 SYRINGE SPRAYER.
P. C. Lewis, Catskill, N. Y.

A brass spray-syringe with rubber piston-head.

Aquapults, &c.

These are light double-acting pumps used with one end supported in a vessel or on the ground. They may be worked in a wagon or while standing, but not while walking. They discharge near the top from the cylinder.

396. JOHNSON'S AQUAPULT.
W. J. Johnson, Newton, Mass.
National Manufacturing Co., Boston, Mass.
Rumsey & Co., Seneca Falls, N. Y.
W. & B. Douglas, Middletown, Conn.

397. PROUTY'S AQUAPULT.

A. B. Prouty, Worcester, Mass.

N. Engl. Butt Co., Providence, R. I.

This has a peculiar packing and longer leg than the foregoing styles.

398. EXCELSIOR PUMP.

R. T. Deakin, Philadelphia, Pa.

A pump similar to the aquapults and subserving the same purposes.

399. BULB-TOPPED AQUAPULT.

Rumsey & Co., Seneca Falls, N. Y.

This is worked like the aquapults, but has an air-bulb on the cylinder.

400. AQUAJECT.

Rumsey & Co., Seneca Falls, N. Y.

A double-acting, air-chambered pump.

401. HYDROPULT.

W. T. Vose, Newtonville, Mass.

A double-cylindered, double-acting, air-chambered pump, used like the aquaject.

Bucket Pumps.

These are light pumps, which discharge from near the base of the cylinder. They are single-acting, used like the aquapults, but mostly less satisfactory.

402. WASHER AND EXTINGUISHER.

Adams & Westlake Mfg. Co., Chicago, Ill.

A small submerged force-pump, fixed in a tin bucket.

403. COMBINATION PUMP.

P. C. Lewis, Catskill, N. Y.

A brass pump with rubber piston-head.

404. TIN PUMP.

A. Stoner, Rising Sun, Ind.

One of the cheapest.

405. EVENDEN'S PUMP.

J. G. Evenden, Chicago, Ill.

A cheap, air-chambered, doubled-walled, tin pump, fixed in a can.

406. DOUBLE-WALLED COPPER PUMP.

F. T. Pinter, Schulenburg, Texas.

A light pump, used for spraying from buckets and barrels.

407. SINGLE-WALLED COPPER PUMP.

F. T. Pinter, Schulenburg, Texas.

This has its air-chamber at one side and is used similar to the preceding pump.

408. AQUARIUS.

W. & B. Douglas, Middletown, Conn.

A brass bucket-pump that will stand long service. It is air-chambered with a top discharge.

409. COMMON FRENCH SPRAY-PUMP—From France.

409½. COTTON-SPRINKLING MACHINE—Model.

G. G. Lynch, Illawara, La.

The pump is worked by wheels. The cylindrical tank has a stirrer kept in motion by the gearing. There is a distributing-pipe discharging from its end by a nozzle for each row, and these parts are held in place by thumb-screw clamps.

Barrel and Tank-Pumps.

These are worked, attached to a barrel or tank, on a wagon or other means of conveyance.

410a. STIRRER-PUMP.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

A double-acting pump inserted in the side-bung of a barrel and having a rocking motion by which a stirrer, on its base in the barrel, is moved back and forth to keep the poison mixed.

410b. MODEL STIRRER-PUMP.

With Under-Spraying Devices.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

Illustrating its use in poisoning the underside of leaves. Pump, the same as 410*a*.

411. W. H. DOUGLAS' PUMP.

Nathan Manufacturing Company, Liberty Street, N. Y.

412. BUCKEYE.

Mast, Foos & Co., Springfield, Ohio.

The single-acting barrel-pumps come under the following numbers. The first three are *durable, cast, cistern force-pumps*, available for spraying from barrels or tanks. They discharge from near the top of the cylinder.

413. UNIVERSAL No. 0.

W. S. Blunt, New York, N. Y.

414. PENDULUM PUMP.

W. & B. Douglas, Middletown, Conn.

415. COMMON CISTERN FORCE PUMP.

W. & B. Douglas, Middletown, Conn.

Rumsey & Co., Seneca Falls, N. Y.

The remaining Nos. represent single-acting, *sheet-metal*, Texas pumps, used for spraying the cotton crop. They discharge from the base of the cylinder.

416. SCHIER'S TIN PUMP.

John Schier, Ellinger, Texas.

Inserted in a large can and bears (1) his return-drip device for saving the poison and (2) his broadcast spray-nozzle.

417. RUHMANN'S BRASS PUMP.

J. P. Ruhmann, Schulenberg, Texas.

A very light pump that will not rust through, and is shown in combination with his adjustable lip slot-nozzle.

418. POLANSKY'S TIN PUMP.

A. J. Polansky, Fayetteville, Texas.

Similar to Mr. Shier's.

Injection Pumps.

For injecting insecticides into the ground to destroy insects affecting the roots of plants.

419. GROUND INJECTION-PUMP.

G. Gastine, "Societé Anonyme," 73 Rue de Bruys, Marseilles, France.

420. GROUND INJECTION-PUMP.

J. Rousellier, Montpellier, France.

The two foregoing pumps are used in France for injecting bisulphide of carbon to destroy the Grape-root *Phylloxera.*

NOZZLE-FORKS.

For Under-Spraying Cotton.

421. WIDE FLEXILE FORK.

With Eddy-Chambered Nozzles.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

422. STIFF NOZZLE FORK.

Weighted and with Curved Arms, Nozzles the same.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

423. STIFF FORK.

With Short Arms and Flexile-Jointed Stem-Pipe.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

424. EQUALIZER FORK.

For use on blowers of insect powders, to underpoison cotton, &c. The intermediate chambered coupling is to distribute the powder in equal quantity through each arm. *Bureau of Entomology, Department of Agriculture, Washington, D. C.*

425. POWDER FORK.

Flexile, Weighted, Joined to Knapsack Powder-Can and Rear-Acting Bellows.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

426. DOUBLE-DISCHARGE FORK.

For Blowers of Powder.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

NOZZLES.

For spraying insecticides. Showing the leading styles. They are used single or in groups combined with force-pumps, such as are shown under Nos. 391–418.

Many-Punctured Nozzles.

These have a many-punctured face by which the liquid is divided into a spray.

427. REMOVABLE-FACED ROSE-HEAD.

L. B. Foss, Dover Stamping Company, No. 88 and 89 N. Street, and T. O Metcalf & Co., Milk Street, Boston, Mass, Manufacturers.

A cheap, light, tin nozzle which opens, permitting its interior to be easily cleaned out.

428. REVERSIBLE-FACED ROSE-HEAD.

W. T. Vose, Newton, Mass.

429. FINE-SPRAY ROSE.

S. H. Fox, St. Louis, Mo.

A close strainer, inside, keeps particles from clogging the finely-punctured face. By unscrewing the caps it may be cleaned out.

430. EDDY-CHAMBERED ROSE.

With Rim Perforations.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

The rotary current of liquid inside lessens the clogging. It has a removable cap and makes a flat spray.

431. EDDY-CHAMBERED ROSE.

With side perforations, like No. 39, but the spray is produced from the side.

432. COLLIDING JET NOZZLE.

National Manufacturing Company, Boston, Mass.

It produces two jets which collide and dash each other into a spray.

Slot-Nozzles.

By these the liquid is forced from a narrow slit in a thin sheet which breaks into spray.

433. FLAT-TUBE SLOT-NOZZLE.

T. H. Fowler, Oakland, Cal.

Used for spraying to destroy insects on trees, &c., in California.

434–435. SINGLE AND TRIPPLE SIDE-SLOT NOZZLES.

John Shier, Ellinger, Texas.

Used on Mr. Schier's spray-pump for poisoning the cotton-worm.

436–437. L-TUBE AND T-TUBE SLOT-NOZZLES.

J. C. Melcher, O'Quinn and Black Jack Springs, Texas.

Similar to Mr. Shier's.

438. SLOT-RIM EDDY-CHAMBER NOZZLE.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

The rotary current inside lessens the clogging. One face is removable by unscrewing. The discharge slot is from the rim.

439. ADJUSTABLE-LIP SLOT-NOZZLE.

J. P. Ruhmann, Schulenburg, Texas.

The slot may be lessened or closed by the thumb-screw.

440. ADJUSTABLE LIP SLOT-NOZZLE.

With Trigger.

J. P. Ruhmann, Schulenburg, Texas.

441. ADJUSTABLE-LIP, DIRECT-DISCHARGE SLOT-NOZZLE.

F. A. Helmecke, Round Top, Fayette County, Texas.

Adjusted by the screw-cap on the lip.

442. SEMI-PLUG SLOT-NOZZLE.

F. T. Pinter, Schulenburg, Texas.

The plug is adjusted and clamped by the eye-screw.

443. MILLED-PLUG SLOT-NOZZLE.

J. C. Melcher, Black Jack Springs P. O. and O'Quinn, Texas.

By the string to an internal eye on the plug it is held to place.

444. DEFLECTOR-SPRAY AND SOLID-JET HOSE-NOZZLE.

C. W. Fifield, Lowell, Mass.

By screwing the barrel it may be set to throw either a solid jet or a spray.

Deflector Nozzles.

These have an inclined plate by which the jet is spread into a flat spray.

445. SIDE-FLANGED DEFLECTOR-NOZZLE.

J. W. Killam, Lakewood, N. J.

One of the simplest of its class.

446. FLANGED STRAIGHT-FRONT DEFLECTOR-NOZZLE.

John Campbell, Selma, Ala., and Montgomery, Ala.

Much used for spraying cotton.

447. RETRACTILE DEFLECTOR-NOZZLE.

P. C. Lewis, Catskill, N. Y.

The deflector is slid back when a solid jet is desired.

448. TRIPPLE-JET, DIRECT DEFLECTOR-NOZZLE.

With Screw Cap.

John Shier, Ellinger, Texas.

It gives greater width than a single spray.

449. MANY-JET PROXIMAL DEFLECTOR-NOZZLES.

With Air-chamber Cap.

John Schier, Ellinger, Texas.

Three modifications are shown. They are used attached vertically on Mr. Schier's spray-pump.

450-451. LARGE DOUBLE-DISCHARGE DEFLECTOR-NOZZLES.

With Blowers.

Centrifugal Spray-Nozzles.

These emit the liquid with a whirling motion, which causes it to break into a spray.

The eddy-chamber nozzels of this group are well suited for under-spraying cotton plants, orange trees, &c. They all operate in essentially the same manner but differ somewhat in size and details of form, as shown.

452. STANDARD SIZE UNDER-SPRAY EDDY-CHAMBER NOZZLE.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

The perforated face unscrews for clearing out the interior.

453. STANDARD UNDER-SPRAY EDDY-CHAMBER NOZZLE.

Showing its Interior.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

It will be noticed that the inlet is from one side of the tube. The chamber has a flat top and base.

454. THICK-LIP EDDY-CHAMBER NOZZLE.
Small Chamber. Large Discharge.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

455. EDDY CHAMBER NOZZLE.
With Filled Neck, Small Chamber, and Large Discharge.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

456. EDDY-CHAMBER NOZZLE.
Beveled Base Discharge.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

457. CONE-CHAMBERED EDDY-CHAMBER NOZZLE.
Exterior and Interior.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

458. SIDE-CONE, SHEET-METAL EDDY-CHAMBER NOZZLE.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

459. LARGE, SIDE-FACED EDDY-CHAMBER NOZZLE.
With Removable Base.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

460. LARGE, SIDE-FACED EDDY-CHAMBER NOZZLE.
As Nose-Piece.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

461. EDDY-CHAMBER NOZZLE.
With Handle or Leg.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

462. EDDY-CHAMBER NOZZLE.
With Handle or Leg.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

463. DIAGONAL-FACED EDDY-CHAMBER NOZZLE.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

464. LARGE, DIRECT-DISCHARGE EDDY-CHAMBER NOZZLE.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

465. MEDIUM DIRECT-DISCHARGE EDDY-CHAMBER NOZZLE.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

466. DIRECT-FACED, SEPARABLE EDDY-CHAMBER NOZZLE.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

467. DIVISIBLE EDDY-CHAMBER NOZZLE.

With Direct Discharge.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

468-469. EDDY-CHAMBER NOZZLES.

With Side and End Discharges, on Long Tube Segments, for Spraying Trees.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

470. BAMBOO-HOSE EXTENSION-PIPE.

With Eddy-Chamber Nozzle. For Spraying in Trees

Bureau of Entomology, Department of Agriculture, Washington, D. C.

471. THE "FAIRY" SPRAY AND SOLID-JET BARREL OR HOSE-NOZZLE.

J. W. Gray, Hartford, Conn.

The shut-off plug can be adjusted to throw a spray or solid jet at will.

472. SPRAY AND SOLID-JET BARREL OR HOSE-NOZZLE.

W. M. Clarke, Newark, N. J.

By rotation of the perforated sheath it may be set for either spray or solid jet.

473. SPRAY AND SOLID-JET BARREL OR HOSE-NOZZLE.

N. Hotz, Inventor.

474. SPRAY AND SOLID-JET BARREL OR HOSE-NOZZLE.

Manufactured in Cincinnati, Ohio.

CENTRIFUGAL THROWERS.

These impart a centrifugal force to the poison and thus scatter it into a spray.

475. ROTARY-BRUSH THROWER OF INSECT-POWDER.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

476. WHISP THOWER OF POISON.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

To be dipped in the poison and then shaken over the plants.

ROTARY BLOWERS OF POISON.

Those here shown are of small size, to be worked suspended on one side or in the hands of a person.

477. FRONT-DISCHARGE ROTARY POWDER-BLOWER.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

478. REAR-ACTING ROTARY POWDER-BLOWER.
With Forked Discharge.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

479. ROTARY BLOWER OF LIQUID.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

OSCILLATING BLOWERS OF POISON.

Under this heading are shown small bellows blowers, worked suspended from the shoulder or carried in the hands.

480. METALLIC, FRONT-HANDLED, OSCILLATING BLOWER.
Bureau of Entomology, Department of Agriculture, Washington, D. C.

To adjustable Powder-feeder [481*a*]; to stiff Under-pipe [482, 483]. The pipe directs the powder upward beneath the foliage to treat its under surfaces.

481a. ADJUSTABLE POWDER-FEEDER—Small.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

To feed insect powders to blasts from blowers.

481b. ADJUSTABLE POWDER-FEEDER.

Long Back-Can.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

To be suspended on the back and be connected with a trailing blast-pipe.

482. SEPARABLE UNDER-PIPES.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

For Powder-blowers to poison under surfaces of plants. Combined with the Flat Knapsack Blower.

483. SEPARABLE UNDER-PIPES.

Same as 482, but with Double Crook.

484. METALLIC BELLOWS BLOWER.

Front-handled. With suspended Side-can and Under-pipe [482].

Bureau of Entomology, Department of Agriculture, Washington, D. C.

485. METALLIC BELLOWS BLOWER.

Rear-acting. Front-handled.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

To back-can feeder [481*b*] and under-fork [482 or 483].

486. LUNG BLOWER.

Bureau of Entomology, Department of Agriculture, Washington, D. C.

Mouth-piece to powder-feeder [481*a*]. To be blown from the mouth.

487. POWDER-BLOWER.

Double-cone Form.

T. K. Woodason, Chicago, Ill.

488 DITTO.
Single-cone Form.

489. COMMON SULPHUR BLOWER OF FRANCE.
E. Vidal, Montpellier, France.

For treating grape vines, &c.

490 and 491 to 496. SMALL POWDER BLOWERS.

For household use. In shallow glass case.

497. NETHER-CHAMBER BLAST-ATOMIZER.
With Mouth-pipe.

For spraying the under surfaces of plants.

498. BLAST ATOMIZER.
With Under-pipe and Whistle-jet.

499. COMMON BLAST ATOMIZER.
Adams and Westlake Mfg. Co., Chicago, Ill.

Dampener, for spraying pot plants, &c.

500. DITTO TO BELLOWS.
T. K. Woodason, Chicago, Ill.

501. BELLOWS-PRESSURE SPRAYER.
W. P. Peck, West Grove, Pa.

The double-oscillating bellows produces a pneumatic pressure in the knapsack can, causing a fine spray from the nozzle, which is carried in one hand.

GRAVITATIONAL DISTRIBUTORS OF POISON.

In the devices of this section the force of gravitation causes the poison to fall finely from a sifter or sprinkler.

502. HANDLED SIFTER.

A common, very efficient little sifter for applying Paris Green or London Purple on the cotton or potato crops.

503. ROTARY-BRUSH SIFTER.

J. S. Smith, Colmar, Pa.

An internal rotary brush is operated by the crank to sift out the poison evenly.

504. SIFTING-CAN OF DALMATIAN INSECT POWDER.

Cutler, Bros. & Co., Boston, Mass.

505. KNAPSACK POISON-DISTRIBUTOR.

With Fine Strainer Nozzle [429].

S. H. Fox, St. Louis, Mo.

506. DITTO.

With Stop-valve, Flexile Nozzle-pipe, and Agitator.

G. W. Townsend, Greenville, N. Y.

Working the handle of the stirrer keeps the poison mixture from separating. The small hand-lever opens a valve. By this the liquid is made to flow or stop at will.

507. BASE-ROSE SPRINKLER.

With Stop-valve.

W. B. Allen, Orleans, N. Y.

Very convenient to use instead of watering-pots.

LAMPS AND TRAPS.

508. COMMON LAMP PAN.

A moth-destroyer used thus with other details to attract and drown the parent of the cotton-worm and other insects. The flying insect attracted by the light falls into the pan which contains common oil or kerosene.

509. BAIT-TRAY MOTH-DESTROYER.

J. G. G. Garrett, Port Gibson, Miss.

The tray contains a mixture of molasses and water with a little vinegar or spirituous liquor added. By this mixture the moths are attracted and drowned.

510. DOWN'S SQUARE OIL-TROUGH TREE-PROTECTOR.

Down's Tree Protector Co., Cutter Square, West Somerville, Mass.

To prevent the canker-worm from ascending the trees.

BEES AND BEE-CULTURE.

BEE-HIVES.

511. Root's two-story Bee-hive for comb honey.
512. Root's one-half story Bee-hive for comb honey.
513. Viallon's two-story Bee-hive for extracted honey.
514. Viallon's one-and-one-half story Bee-hive for comb honey.
515. Shirley's common-sense Bee-hive.
516. Heddon's Bee-hive, with surplus arrangements for comb honey.
517. Root's Observatory hive.
518. Gunn's Observatory hive.

FRAMES FOR BEE-HIVES.

519. Langstroth's frame.
520. Langstroth's wired frame.
521. Langstroth's wired frame, with comb foundation.
522. Langstroth's wired frames, with comb foundation worked by the bees.
523. Wide frame with tin separators filled with one-pound sections.

SECTION OR HONEY BOXES.

524. Gray's all-in-one-piece section boxes.
525. Hunt's all-in one-piece section boxes.
526. Heddon's dovetailed section boxes.

BEE SMOKERS.

427. Quinby's Bee Smoker.
528. Root's Cold-Blast Smoker.
529. Bingham's Doctor Bee Smoker.
530. Bingham's Conqueror Bee Smoker.
531. Bingham's Large Bee Smoker.
532. Bingham's Standard Bee Smoker.
533. Bingham's Little Wonder Bee Smoker.
534. E. T. Lewis' Bee Smoker.

HONEY KNIVES.

535. Root's Honey Knife, (straight.)
536. Root's Honey Knife, (curved.)
537. Muth's Honey Knife.
538. Bingham & Hetherington's Honey Knife.

QUEEN CAGES.

539. Hasting's Queen Mailing Cage.
540. Harris' Queen Mailing Cage.
541. Root's Queen Mailing Cage.
542. Root's large Queen Mailing Cage for long distances.
543. Introducing Queen Cage.

HONEY EXTRACTORS.

544. Muth's Honey Extractor.
545. Lewis' U. S. Standard Honey Extractor.
546. Stanley's Automatic Honey Extractor.
547. Excelsior Wax Extractor.
548. Dadant's Uncapping Can.

BEE FEEDERS.

549. Root's Simplicity Bee Feeder.
550. Gray's Covered Bee Feeder.
551. Heddon's Standard Bee Feeder.
552. Locke's Perfection Bee Feeder.

COMB FOUNDATION.

553. Given's Comb Foundation.
554. Hunt's Foundation for Brood Frames.
555. Hunt's Foundation for Section Honey Boxes.
556. Sheets of wax before it goes through the Foundation Mill.
557. Pelham's Foundation Mill.
558. Given's Foundation Press.
559. Parker's Foundation Fastener.
560. Gray's Foundation Fastener.
561. Blood's Roller for imbedding foundation in wired frames.
562. Root's Wire Imbedder.
563. Carlin's Foundation Cutter.

MISCELLANEOUS APPARATUS.

564. Enamelled Sheets for covering frames.
565. Cotton Duck " "
566. Wood Mat " "
567. Perforated Zinc Honey Board.
568. Chaff Division Board.
569. Burlap's Cushion.
570. Hill's Device for wintering bees.
571. Morton's Drone and Queen Catcher.
572. Alley's Drone Excluder.
573. Hunt's Drone Excluder.
574. Root's Comb Bucket.
575. Root's Comb Basket.
576. Root's Shipping Honey Case.
577. Heddon's Shipping Honey Case.
578. Root's Comb Holder.
579. Holden's Bee Veil.
580. Viallon's Bee Veil.
581. Yucca Brush for removing bees from combs.
582. Davis' Improved Brush.
583. Root's Lamp Nursery.
584. Jones' Entrance Guard.
585. Root's Queen Registering Card.
586. Slate Tablets or Hive Register.
587. Transferring Clasps.
588. Root's Metal Corners for frames.
589. Board to hold wire for wiring frames.
590. Spruce Keg for honey.
591. Rubber Gloves for handling bees.

HONEY PLANTS.

592. Herbarium specimens of the best Honey Plants, mounted under glass, and labelled with name and time of blooming.

RACES OF BEES.

593. Frame, containing specimens of races of bees preserved in alcohol.

HONEY.

594. Several varieties of comb honey in 1-pound sections (unnamed).
595. Extracted Honey, in glass jars, from Buckwheat.
596. " " " Poplar.
597. " " " Horsemint.
598. " " " Mangrove.
599. " " " Palmetto.
600. " " " Clover.
601. " " " Basswood.
602. " " " Rocky Mountain Bee Plant.
603. " " " Canada Thistle.
604. " " " White Clover.
605. Several varieties of honey in tin cans (not named).
606. Honey wine.
607. Honey vinegar.
608. Honey preserves.
609. Honey cakes.

SILK-CULTURE.

Machinery.

610. SERRELL AUTOMATIC SILK-REEL.

Loaned by the Serrell Silk Reeling Company, New York.

611. SERRELL SERIGRAPH.

For measuring the irregularities in silk threads. Loaned by E. W. Serrell, Jr., Esq., Chabeuil, France.

612. COCOON BRUSHING MACHINE.

Loaned by E. W. Serrell, Jr., Esq., Chabeuil, France.

613. SERIMETER.

For measuring the elasticity and breaking strength of silk threads.

614. EPROUVETTE.

For winding off a skein of silk 476 meters long, the weight of which indicates the standard size of the silk.

615. BALANCE.

For weighing the skeins coming from the eprouvette.

616. HOOK FOR TWISTING SKEINS OF SILK.

Magnanerie Implements.

617. PERFORATED TRANSFER PAPER,

Donated by I. Carpenter, Esq., of Cherry Creek, N. Y.

618. TRANSFER-DRAWER.

For transferring perforated paper and its charge of leaves and worms from one table to another.

619. KNIFE.

For chopping mulberry leaves.

620. A MODEL MAGNANERIE IN WHICH SILK WORMS WILL BE RAISED DURING THE EXHIBITION.

SAMPLES OF COCOONS AND RAW SILK OF EUROPEAN ORIGIN.

621. 1. Yellow Race, Cevennes, (France).
622. 2. " " Drome and Isere, (France).
623. 3. " " Var and Vaucluse, (France).
624. 4. " " Bionne.
625. 5. " " Piedmont, (Italy).
626. 6. " " Lombardy, (Italy).
627. 7. " " Tuscany, (Italy).
628. 8. Green Race, Piedmont, (Italy).
629. 9. " " Lombardy, (Italy).
630. 10. " " Noukha, (Caucassian Russia).
631. 11. White Race, Piedmont, (Italy).

632. PLATES.

From Mr. Pasteur's work, "Studies on the diseases of silk worms."

633. CHART.

Showing the mean annual production of cocoons per ounce of eggs incubated, in the four principal silk producing departments of France, from 1872 to 1882, inclusive.

634. DIAGRAMS—Japanese.

Showing anatomical system of silk worm.

635. COLLECTION OF EGGS, LARVÆ, MOTHS, AND COCOONS OF VARIOUS NATIVE AND FOREIGN RACES OF SILK WORMS, LOANED BY C. V. RILEY.

636. SILK REELED AT SILKSVILLE, KANSAS, IN 1878.

From a strain of worms raised by C. V. Riley, and fed on Osage Orange for seven consecutive years.

637. REELED SILK—Sericaria mori.

Japanese Centennial Exhibit.

638. REELED SILK AND COCOONS—Sericaria mori.

Japanese Paris Exhibit. 1878.

639. RAW SILK—Sericaria mori.

Used for Sewing Silk.

640. SILK FLOSS—Sericaria mori.

641. Carded Wadding, AILANTHUS SILK WORM.

Samia cynthia.

642. Reeled Silk and Fabric of the AILANTHUS SILK WORM.

Samia cynthia.

643. REELED SILK

Antheræa perneyi—Oak leaf fed.

644. PLUSH.

Silk of Antheræa perneyi.

645. REELED MEZANKOORIA SILK.

646. COCOONS—Tusseh Silk Worm.

647. REELED TUSSEH SILK.

648. ERIA REELED SILK AND COCOONS.

649. SILK GUT.

Platysamia cecropia.